JPRS-TTP-85-015

31 May 1985

Worldwide Report

TELECOMMUNICATIONS POLICY, RESEARCH, AND DEVELOPMENT

FBIS FOREIGN BROADCAST INFORMATION SERVICE

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WORLDWIDE REPORT

TELECOMMUNICATIONS POLICY, RESEARCH AND DEVELOPMENT

CONTENTS

ASIA

INDIA

IRAN

SUB-SAHARAN AFRICA

WEST EUROPE

CAMBODIA

BRIEFS

CSSR BROADCAST COOPERATION PROTOCOL--At a ceremony in Phnom Penh on 28 March, Comrade Kim Yin, member of the KPRP Central Committee and director general of the Voice of the Cambodian People, and Comrade Jiri Veseli, CSSR ambassador extraordinary and plenipotentiary to the PRK, signed a protocol on radio-television cooperation between the PRK and CSSR. The ambassador also handed over a direct TV transmission truck to the PRK. [Summary] [Phnom Penh Domestic Service in Cambodian 2300 GMT 28 Mar 85 BK]

CSO: 5500/4329

INDONESIA

RIGHTS OVER GEOSTATIONARY ORBIT CLAIMED

HK131204 Hong Kong AFP in English 1129 GMT 13 May 85

[Text] Jakarta, May 13 (AFP) -- Indonesia has claimed territorial rights to a piece of space located above the country, a newspaper reported today.

Professor Priyatna Abdul Rasyid said that included in Indonesia's area of sovereignty should be the country's geo-stationary orbit (GSO) -- the strip of space where satellites can be positioned to keep pace with the earth's orbit and stay over Indonesia -- the MERDEKA newspaper said.

Indonesia will fight to establish its rights over its 36,000 kilometer (22,500 mile)-long GSO, said Prof. Priyatna, an assistant to the minister coordinator of political and security affairs. Indonesia could make use of the Chicago Convention, which defines a country's rights to space, in demanding recognition of sovereignty over its GSO, the space law expert added.

"Whoever controls the GSO, controls the world", Prof. Priyatna was quoted as saying. He added that a GSO has immense military strategic importance as it could be made the site of a military base or surveillance centre.

A mammoth mirror sent up to a GSO could reflect the sun's light back to the owner-country as a huge source of energy, he told a meeting of information officials here this weekend.

CSO: 5500/4330

JAPAN

FUJITSU TRIES NEW TELEPHONE NETWORK IN SINGAPORE

OW250657 Tokyo KYODO in English 0647 GMT 25 Apr 85

[Text] Tokyo, 25 April (KYODO)--A new sophisticated multimedia communications service network, based on a combination of the existing telephone exchange network and latest digital transmission and switching technology, has just been put to field trials in Singapore, Fujitsu said Thursday.

The network, called "Integrated Serviced Digital Network (ISDN)," has been developed jointly by the telecommunications authority of Singapore (Telecoms) and Fujitsu on the basis of a recommendation by the International Telegraph and Telephone Consultative Committee (CCITT).

A Fujitsu spokesman claimed the field trial is the first of its kind in the world, saying more than two local exchanges, now in operation, are used, and the network is based on a CCITT recommendation.

The spokesman said Fujitsu signed contract with Telecoms in 1982 to supply digital telephone switching systems up to 320,000 telephone circuits over a long period.

He said Telecoms and Fujitsu have since worked to develop the ISDN Network.

The official said ISDN hardware and software are added to three local telephone exchanges and a tandem office, now in operation. Such terminals as digital phones, facsimiles and personal computers are installed at subscribers' homes for multimedia communication test by means of a single network, he said.

Multimedia communication means not only voice (telephone) communication but also non-voice communication such as data, image and facsimile, he added.

CSO: 5500/4518

KDD, SBS PLAN LEASED-CIRCUIT SATCOM DATA SERVICE

OW301101 Tokyo KYODO in English 1051 GMT 30 Apr 85

[Text] Tokyo, 30 April KYODO--Kokusai Denshin Co, (KDD) announced Tuesday that it and America's Satellite Business Systems (SBS) would jointly start a leased-circuit service Wednesday linking Japan and the United States for medium- to high-speed digital data transfer via satellites.

KDD is presently Japan's sole international telecommunications service company in operation, and SBS is a subsidiary of International Business Machines Corp (IBM).

According to a KDD spokesman, Intelsat Pacific, U.S. domestic and SBS satellites will be used in the service for medium- to high-speed transmission, mainly of data, between the two countries. He said the service may also be used to transmit voice.

IBM Japan, Ltd, planning a leased-circuit data linkage with its parent company, is believed likely to be the first to utilize the new KDD-SBS service.

The spokesman said the offered transmission speed ranges from 1.2 to 56 kilobits per second. In case of a 56-kilobit transfer service, the circuit charge payable by a business in Japan to KDD is 3.84 million yen per month, he said.

The business concerned in the United States will pay a circuit charge set by SBS.

The spokesman said SBS is the eighth American concern to enter into a leased-circuit service arrangement with KDD. American Telephone and Telegraph Co and International Telephone and Telegraph Corp are among the seven American companies now under contract with KDD.

CSO: 5500/4518

KDD TO BUILD EARTH STATION FOR SATELLITE LINKS

OW3010O5 Tokyo KYODO in English 0900 GMT 30 Apr 85

[Text] Tokyo, 30 April KYODO--Kokusai Denshin Denwa Co, Japan's only international telecommunications corporation, has decided to built an 80 billion yen earth station for international satellite communications at Oyama in Tochigi Prefecture, north of Tokyo, reliable sources said Tuesday.

It will be the third earth station to be built by KDD, and is intended to be in use for the start of an Intelesat Business Service (IBS)--a high-speed digital leased circuit service for business-to-business communications, using a communications satellite for the Pacific area, according to the sources.

The company at present has two earth stations, one each in Ibaraki and Yamaguchi Prefectures.

The sources said the new service which KDD is planning to introduce is a Pacific version of the IBS started in October 1983 by Intelsat for business communications between North America and Europe, using an Atlantic satellite.

According to the sources, the present old-type No 4-A satellite, now operating over the Pacific, is not suitable for the IBS service. However, the No 5 satellite is expected to be made available to the Pacific area between next January and March, enabling Intelsat to begin an IBS service in the Pacific region.

In the case of IBS, general businesses can own their own earth stations, enabling them to use the satellite for communications.

In Japan, however, the time has yet to come when individual businesses own their own earth stations. KDD is therefore going to build an earth station to transmit and receive signals and codes to and from overseas businesses.

KDD plans to link the station and subscriber businesses in Japan by means of a high-speed digital circuit.

According to the sources, the IBS service makes possible an ultrafast--six megabits per second--international telecommunications network covering data, facsimile, images and teleconferencing. It is believed that KDD will start the service late next year.

Large Japanese businesses, such as banks, securities firms, trading giants and automakers, which send a large amount of data overseas, are showing interest in KDD's contemplated service.

CSO: 5500/4518

LONG-TERM GOALS FOR RADIOWAVE USE

Tokyo DENPA GIJUTSU SHINGIKAI TOSHIN in Japanese Jun 84 pp 117 - 120, 139 - 141, 148 - 160, 189 - 230, 241 - 242

[Text] 3.1 Current State of Data Communications Services

(1) Services Offered by NTT

NTT already offers many data communications services utilizing the corporation's nationwide networks. Most of these services are geared toward public use. The services offered by NTT include "Public Data Communications Services," wherein systems provided beforehand by NTT are jointly used, and "Specific Data Communications Services," which provide specialized services in response to users' requests.

A. Public Data Communications Services

As public data communications services, a marketing-inventory management service (DRESS) has been offered since 1970, and a science & technology computing service (DEMOS) has been available since 1971. In August, 1983, in response to demands from diversifying and increasingly sophisticated users, the networks for these two services were joined together, and new functions were added. This system is used mostly by relatively small companies.

B. Specific Data Communications Services

The specific data communications services involve primarily network systems having a nationwide scale and include such social-welfare and social-development public systems as the automobile registration examination system, emergency medical information system, and weather observation data system (AMEDAS), such banking systems as the all-bank system and credit-bank system, and a seat reservation system. Utilization trends for these systems are indicated in Table III-3-1. A breakdown of the businesses served is given in Table III-3-2. Financial businesses, emergency medical information, and hospital information businesses together account for more than 80 percent of total utilization.

Table III-3-1 Trends for Specific Data Communications Systems

表Ⅲ－3－1 各種データ通信システムの推移

(1) 区分 ＼ 年度末 (昭和)	1973 48	'74 49	'75 50	'76 51	'77 52	'78 53	'79 54	'80 55	1981 56	1982 57
(2) システム数	25	26	30	36	39	44	52	55	60	65
(3) 端末数	2.418	3.765	4.491	5.851	6.460	7.663	9.398	11.328	12.730	14.434
(4) 1システム当たりの平均端末数	96.7	144.8	149.7	162.5	165.6	174.2	180.7	206.0	212.2	222.1

(5)（通信白書から）

Table III-3-2 Breakdown of Businesses Served by Specific Systems

表Ⅲ－3－2 各種システムサービスの対象業務内訳

(1) 年度末 (昭和) ＼ (2) 対象業務	1978 53 (3) システム数	(4) 構成比	'79 54 (3) システム数	(4) 構成比	'80 55 (3) システム数	(4) 構成比	'81 56 (3) システム数	(4) 構成比	'82 57 (3) システム数	(4) 構成比
(5) 金融業務	27	61.3%	29	55.9%	29	52.8%	29	48.2%	31	47.7%
(6) 自動車貸借検査業務	1	2.3	1	1.9	1	1.8	1	1.7	1	1.5
(7) 座席予約業務	1	2.3	1	1.9	1	1.8	1	1.7	1	1.5
(8) 技術関係業務	4	9.1	2	3.9	2	3.6	1	1.7	1	1.5
(9) 信用・調査・証券業務	2	4.5	2	3.9	2	3.6	2	3.3	2	3.1
(10) 気象観測情報業務	1	2.3	1	1.9	1	1.8	1	1.7	1	1.5
(11) 環境情報業務	1	2.3	1	1.9	1	1.8	1	1.7	1	1.5
(12) 生鮮食料品流通情報業務	1	2.3	1	1.9	1	1.8	1	1.7	1	1.5
(13) 教育医学情報・病院情報業務	5	11.4	12	23.0	15	27.4	20	33.3	21	32.3
(14) 官庁会計業務	1	2.3	1	1.9	1	1.8	1	1.7	1	1.5
(15) 受注業務	—	—	1	1.9	1	1.8	2	3.3	2	3.1
(16) 自動通関検針業務	—	—	—	—	—	—	—	—	1	1.5
(17) 新聞記事情報業務	—	—	—	—	—	—	—	—	1	1.5
(18) 計	44	100.0	52	100.0	55	100.0	60	100.0	65	100.0

(19)（通信白書から）

Key to Table III-3-1:

1. Category
2. Number of systems
3. Number of terminals
4. Average number of terminals per system
5. (From white paper on communications)

Key to Table III-3-2:

1. End of fiscal year
2. Business served
3. Number of systems
4. Percentage composition
5. Financial
6. Automobile registration inspection
7. Seat reservation
8. Tax-related
9. Credit, purchasing, sales
10. Weather observation data
11. Environmental information
12. Fresh-food distribution information
13. Emergency medical information / hospital information
14. Government-office accounting
15. Insurance
16. Automatic remote inspection
17. Newspaper article information
18. Totals
19. (From white paper on communications)

In connection with such public data communications systems as DRESS and DEMOS, it has become possible to do one's own processing due to the lower costs of small computers made possible by recent advances in hardware technology. Accordingly, the demand for these services, which focus on computer centers, is expected to decline. Demand for the specific data communications services is expected to grow, however, particularly in the financial and community-related areas. Increased demand is believed to be especially probable as automation is further implemented in governmental and community-related offices.

(2) Services Offered by KDD

The services offered by KDD include public subscription data transmission services and communications-equipment services. With respect to the former, the "International Public Data Transmission Service (VINUS-P)" was begun in April, 1982, utilizing a packet exchange system, and as of March, 1984, the service connects with 20 countries. The latter category includes an international automech service, separate system service, and international airline data communications service. In the international

automech service, communications lines linking terminals in Japan and overseas are connected to a computer installed in KDD's center, and message exchanges are conducted between users, of whom there were 19 as of March, 1984. The separate system service provides message communications services by installing systems according to users' needs. There were five systems in place as of March, 1984. The international airline data communications service is a service for transmitting and exchanging messages concerning seat reservations and air cargo to and between airlines which are members of SITA (International Airline Communications Association).

(3) Services Provided by Private Data-Communications Vendors

As of December, 1982, private data-communications vendors were providing 292 services. A breakdown of these services is given in Table III-3-3. The areas served are indicated in Table III-3-4. The number of users per system and terminal conditions are shown in Figures III-3-1 and III-3-2.

Table III-3-3 Systems Provided by Private Data-Communications Vendors Classified by Business Served (as of December 31, 1982)

Use	Systems
Sales, inventory management	62
Securities trading	4
Banking	14
Other special businesses	70
Multi-purpose	142
Total Number of Systems	292

(From white paper on communications)

Table III-3-4 Areas Served by Private Data-Communications Vendors (as of December 31, 1982)

Areas Where Service Is Provided	Number of Services
Nationwide Services	82
Regional Services	
Tokyo Area	69
Osaka Area	38
Nagoya Area	30
Other Areas	145

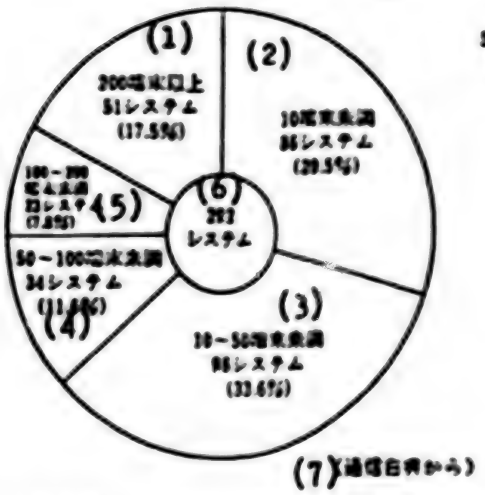
(Note: Multiple responses for regional services)
(From white paper on communications)

Figure III-3-1 Number of Systems Provided by Private Vendors, by Number of Terminals (as of Dec 31, 1984)

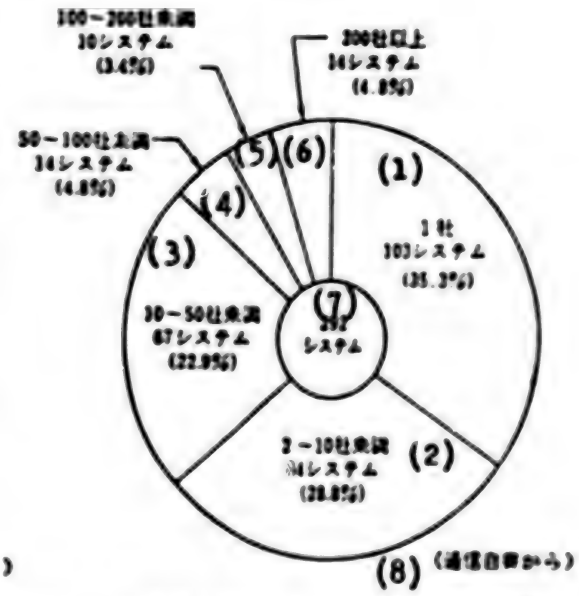
Ave Number of Terminals per System = 196.4

Figure III-3-2 Number of Systems Provided by Private Vendors, by User Scale (as of 12/31/84)

Ave Number of Users per System = 49.1



図Ⅲ－3－1 民間の情報通信事業者の端末数別システム数
（昭和57年12月末現在）
1システム当たり平均端末数＝196.4



図Ⅲ－3－2 民間の情報通信事業者のユーザ数別システム数
（昭和57年12月末現在）
1システム当たり平均ユーザ数＝49.1

Key to Figure III-3-1:

1. 200 or more terminals: 51 systems (17.5 percent)
2. Fewer than 10 terminals: 86 systems (29.5 percent)
3. 10 - 49 terminals: 98 systems (33.6 percent)
4. 50 - 99 terminals: 34 systems (11.6 percent)
5. 100 - 199 terminals: 23 systems (7.8 percent)
6. 292 systems
7. (from white paper on communications)

Key to Figure III-3-2:

1. 1 company: 103 systems (35.3 percent)
2. 2 - 9 companies: 84 systems (28.8 percent)

3. 10 - 49 companies: 67 systems (22.9 percent)
4. 50 - 99 companies: 14 systems (4.8 percent)
5. 100 - 199 companies: 10 systems (3.4 percent)
6. 200 or more companies: 14 systems (4.8 percent)
7. 292 systems
8. (from white paper on communications

3.2 Trends in Information Communications Systems

(1) Database Services

A database is an information file in which data has been gathered, organized, and consolidated so that it can be computer-processed. Databases are divided between textual databases which contain information from newspapers, magazines, and books, etc., and non-textual databases which contain economic statistics or company financial data, etc. In 1980 there were 654 textual databases and 755 non-textual databases in the world, and the numbers are growing rapidly.

There are a number of reasons for the rising demand for databases. In a world made more complex by increasingly diversified and voluminous information, it is becoming more and more important to obtain accurate information quickly. Also, it requires much labor and time to manually select and collect necessary information, imposing limits on information users.

The nations of Europe and North America are actively engaged in constructing databases. The vast majority of these databases are prepared in the United States. Representative data bases for Europe and the United States are indicated in the following Table.

Table III-3-5 Representative Database Management Systems--Characteristics and Utilization

表Ⅲ－3－5 代表的なデータベース管理システムの特徴と利用状況

(1)システム名	TOTAL	INS-VS	ADAVAS	IDMS	DMS I	DMS 1100	DATACOM/DB
(2) 開発会社	(6)システム社	IBM	(7) AG	(8)ーン社	(9)ーメ	(10)	(11)ー社
(3) 開発年	1974	1970	1976	1976	1973	1970	1982
(4) ユーザ数(1981.6)	5,300	約1,500	950	1,000以上	400以上	約600	350
(5) 主な(12)ノリカ	(12)リカ	(13)ドイツ	(12)リカ	(12)カ	(12)カ	(12)リカ	

Key to Table III-3-5:

1. Name of system
2. Marketing company
3. Year put on market
4. Number of users (June, 1981)
5. Country
6. Syncom Systems
7. Software AG
8. Karinen [phonetic]
9. Burroughs
10. Sperry Univac
11. Adoraido [phonetic] Data Research
12. United States
13. West Germany

Databases are also being prepared in Japan, with emphasis on scientific and technological information, patent information, and economic data, but we are quite far behind Europe and America in this area. However, with personal computers now widely used in homes and offices, conditions are such as to allow easy data access, and interest in obtaining information is on the rise. For these reasons, growth in this area is expected to be the highest of all data communications services. In the future, if language translation technology is developed and language barriers are removed, it is believed that international utilization will expand rapidly.

(2) VAN's (Value Added Networks)

VAN's are high-level communications services wherein lines are rented from public communications companies and connected to computers, and such operations as protocol and format modifications are performed using the accumulation and modification functions of computers, thereby facilitating the transmission of text and other data between data communications systems of different companies.

VAN's are presently recognized only for medium and small businesses, according to the second data communications liberalization of October, 1982. There are, as of August, 1983, eight vendors offering this service, but even greater liberalization of the administrative system is being promoted now in order to more efficiently cope with communications demand.

As with the database services, large growth is predicted for VAN services since they provide a means of offering detailed information services to companies and households by linking up with the various banking systems and intra-company information networks.

7 Factory Automation (FA)

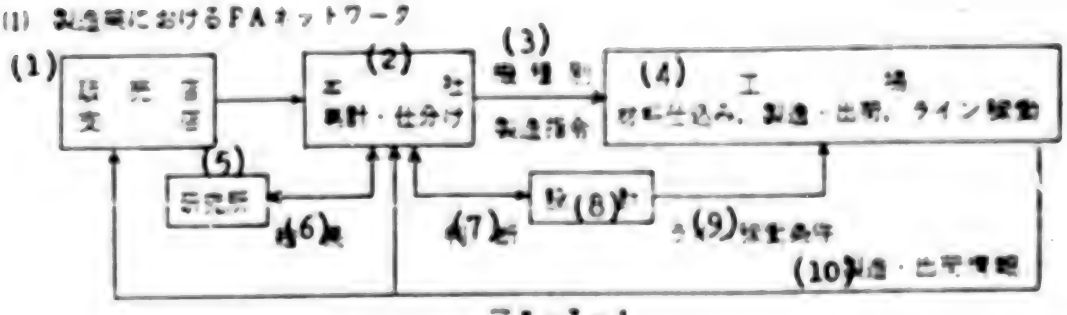
The operations performed in the manufacturing industry include the collection of information for production, decision making, management, the manufacturing process proper, delivery, and marketing, which are performed in parallel with research into new fields and the design of new products. In order to do all of these things efficiently, information must be processed and communicated between the head office, branch offices, research facilities, and sales offices, as well as circulated internally within each of these units. Robots are being used in the manufacturing processes to perform such tasks as material transport, machining, adjustment, and inspection, and it is necessary to communicate information and control commands to these robots.

7.1 Current State of FA

Whereas OA (office automation) seeks to enhance the efficiency of office work, FA is concerned with the entire process of manufacturing, and, in the broader sense which includes the automation of machine tools and inspection devices in the factory, seeks to enhance the efficiency of the manufacturing and distribution processes which utilize data communications and data processing. Accordingly, factory-operation robots and CAD/CAM systems are considered within the framework of information communications and processing systems which are necessary to make the manufacturing and distribution processes more efficient.

(1) FA Network for Manufacturing Business

Figure III-7-1



図Ⅲ-7-1

Key:

1. Sales offices, branch offices
2. Head office (collection & classification)
3. Manufacturing instructions for each model

4. Plant (stocking materials, manufacture, delivery, line operation)
5. Research facility
6. Results
7. Decisions
8. Design
9. Line operation conditions
10. Manufacturing & shipping information

In the example shown in Figure III-7-1, the classification of merchandise ordered, manufacture, procurement, and sales aggregation, etc., are all done automatically in an integrated manner. Inputs into plant machines for new products and cost calculations according to market prices are also performed automatically. More specifically, the following operations are performed while communicating data and graphic information both inter-divisionally and intra-divisionally.

(a) Computational processing for aggregation, classification, sales, and costs in the business division at the home office
(b) Statistics and data processing for management decisions
(c) Material selection and purchase, manufacturing and inspection, sorting and dispatch of shipments at the plant
(d) Research management and document search at research installation
(e) Design computations in design department, output of plant operating conditions

Most applications are now for relatively high-volume, low-product-diversity operations, but applications will probably be made in the future for low-volume, high-product-diversity operations.

(2) Effects of Industrial Robot Implementation, Fields Affected

Industrial robots are extremely effective for performing work in harmful environments and tedious, time-consuming work. The benefits which can be expected from using robots include increased production, lower costs, manpower conservation, unmanned operations, quality improvement, stabilization, improvement of harmful work environments, making up for skilled-worker shortages, and ease of handling product modifications.

Besides production plants in general, the fields where robots are used include the following.

In the field of construction and civil engineering, practical use is already being made of robots in spraying on finishing concrete inside tunnels. Also now on the drawing board are robots for assembling concrete forms and installing these at construction sites, robots for making steel reinforcing rod assemblies, robots for installing internal and external

panels on tall buildings, and robots for automatically painting the girders of large bridges.

In the area of ocean-survey and underwater robots, some implementation has been made in underwater unmanned bulldozers and robots that walk on the ocean floor for the purpose of submarine oil-field development and surveying sunken ships and explosives. Basic survey research is also being carried on for robots which inspect, clean, and paint ship bottoms and perform underwater welding for repair purposes.

Some robots are also being used for human rescue and firefighting, and robots are being developed for inspecting and maintaining reactors at nuclear power facilities. There is also an urgent demand for robots to excavate coal in coal mines, perform powerline work, and clean insulators on high-tension lines.

In the fields of agriculture and forestry, research is being done on robots to replace men in such operations as limb-trimming and thinning out in forests, applying fertilizers and agricultural-chemicals, and processing beef and pork.

7.2 Technologies Applicable to FA

(1) Communications Technology

All of the communications technologies are being applied to the transmission, accumulation, and processing of information, and both VAN's and LAN's are in use. Some technology is peculiar to FA, however, such as robot command communications technology. By providing robots with voice-recognition functions, for example, this can be used to direct unmanned mobile robots. Or, using voice-synthesizing functions, robots can communicate various information by voice to controllers located in a central control room where many robots are managed.

(2) Data-Processing Technology

In addition to general management-use data-processing technology, some technology is peculiar to FA, such as the technology for teaching robots new operations. In other words, it is possible to provide robots with learning functions so that they can make repeated trials while doing the work themselves, gather various sorts of information, and make corrections until the work becomes perfect.

(3) Telemetry-Sensing Technology

This technology is of course used in detecting flaws and errors in products, but it can also be used in the robots themselves and thereby further enhance automation. Specifically, each robot can immediately detect its own malfunctions or wear in its parts, locate the problem, and

notify a human of the situation or take other safety precautions. This technology is indispensable in providing robots with self-diagnostic, self-repair functions. These functions would permit robots to discover their own malfunctions or problems, repair these, and restore themselves to normal.

(4) Database Technology

This technology is indispensable in taking full advantage of knowledge and experience in manufacturing. For example, microcomputers and various technological-information databases are used in automatically preparing design drawings, and CAD/CAM technology is employed in operating NC machine tools.

7.3 Radiowave Utilization Peculiar to FA Systems

In ordinary production plants where enhanced productivity and higher product quality are demanded, radiowaves will be effectively used in such operations as remote-concentrated monitoring and control of production processes, recognition of product position and size during automated processes, heating of industrial materials, and product inspection, etc.

Radio control is ideal from the perspective of work-area expansion and robot mobility in performing work in adverse environments such as are encountered in coal mines, atomic reactors, submarine operations, construction and civil engineering, firefighting, and space exploration.

The mobilization of FA equipment controlled by radiowaves and the rendering of sensors and wire-wireless dual systems more reliable by using radiowaves are particularly effective, and the importance of radiowave utilization in FA is expected to continue to increase.

(1) Remote Control of Moving Objects

Sound waves, radiowaves, and infrared beams are used to control moving objects and remote objects. However, since radiowaves are complex and facilitate the communication of high-level information, they are ideal for use in remote-control applications such as the control of multiple mobile robots or transfer machines.

(2) Sensors

Radiowaves are widely used in the inspection and testing of invisible product-interiors using microwave sensors and in determining product position and speed by means of Doppler radar. There are also television cameras (optical sensors) which use radiowave technology and touch sensors which employ magnetic distortion. Radiowave-related technology is widely used.

(3) Robot Control in Adverse Environments

Radio control is essential for controlling robots in such remote regions as outer space and in environments where communications via sound or light waves are not possible.

(4) Industrial Use of High Frequencies

Because of its excellent heat-controllability, inductive heating through combinations of temperature sensors and high-frequency inverters is used in heat-treating and processing materials in production plants. Careful temperature control of materials is also possible by inductive heating.

(5) Making Systems More Reliable

One general approach in raising the reliability of systems is redundancy. In implementing redundancy, it is desirable to combine two dissimilar systems, such as a wire system and a wireless system.

2 Integrated Services Digital Network (ISDN)

2.1 Background of ISDN

(1) ISDN

As discussed in the foregoing section, integrated (consolidated) services networks began to be studied in the late 1960's. Up until then, telecommunications networks had been built for telephone networks, telegram relay networks, telex networks, and some facsimile lines. At this time, however, engineers began to study ways of conducting data communications operations via public communications networks. At the same time that digital transmission routes began to be implemented, the engineers and researchers were studying ways to create networks which would integrate many different operations, so that the inefficient separate operation-specific networks could be abandoned and a new age of communications networks ushered in. Discussion at the research stage is now focused on existing facilities, operation-by-operation traffic, and technological levels.

At the present time, separate telecommunications networks are in place, each serving a specific purpuse. These include registered telephone networks, telegraph relay networks, telex networks, digital-data exchange networks, and facsimile transfer networks.

The reason why separate networks have been formed for each service is that it was most economical to do so, given the dissimilarity of information handled, and the fact that different technologies were used in implementing the networks, since there was no well-developed technology for

(3) Robot Control in Adverse Environments

Radio control is essential for controlling robots in such remote regions as outer space and in environments where communications via sound or light waves are not possible.

(4) Industrial Use of High Frequencies

Because of its excellent heat-controllability, inductive heating through combinations of temperature sensors and high-frequency inverters is used in heat-treating and processing materials in production plants. Careful temperature control of materials is also possible by inductive heating.

(5) Making Systems More Reliable

One general approach in raising the reliability of systems is redundancy. In implementing redundancy, it is desirable to combine two dissimilar systems, such as a wire system and a wireless system.

2 Integrated Services Digital Network (ISDN)

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processing and integrating all the different kinds of signals. Recent advances in electronics have made it technologically and economically feasible to handle various kinds of data which have been converted into a uniform mode, i.e. into digital signals. This has made it possible to operate telecommunications networks economically and efficiently by employing the same exchanges and the same transmission routes for various kinds of information.

ISDN (integrated services digital network) is a term employed by CCITT (Comite Consulatif pour Telegraphic et Telephonie), and signifies a telecommunications network which integrates many types of service, based on the digitalization and integration of telecommunications networks.

(2) Advantages of ISDN

ISDN is expected to provide the following benefits.

(a) Improvement in Communications Quality Through Eliminating Buildup of Noise and Attenuation Distortion Due to Distance and Number of Links

Data signals have conventionally consisted of such analog signals as voice and images, and digital signals for data, etc. In order to integrate these and transmit them together, all signals are digitalized. This digitalization results in much less noise and distortion buildup, and makes it possible to improve communications quality.

(b) Enhanced Network Economy Through Integrating and Simplifying System Configurations for Exchanges and Transmission Routes

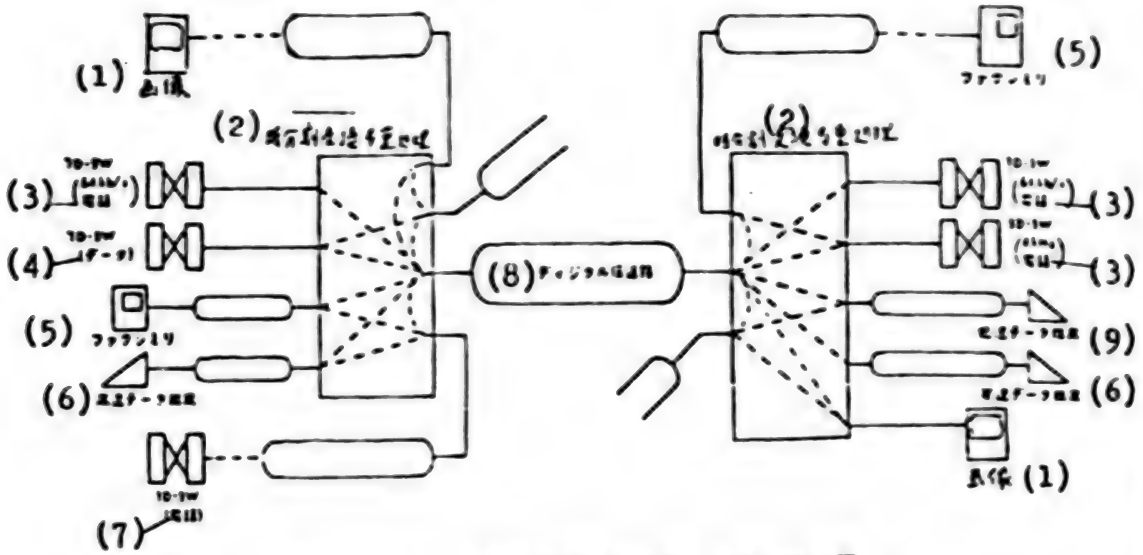
In order to economically transmit data signals input from various kinds of terminal, and provide low-cost exchange and connection with terminals in other regions, various kinds of digital signals having different speeds are converted and multiplex-transmitted. A conceptual diagram for this process is given in Figure IV-2-1.

(The foregoing are benefits of digitalization.)

(c) Enhanced Utilization Efficiency of Communications Network Through Joint Use of Equipment & Facilities by Dissimilar Businesses

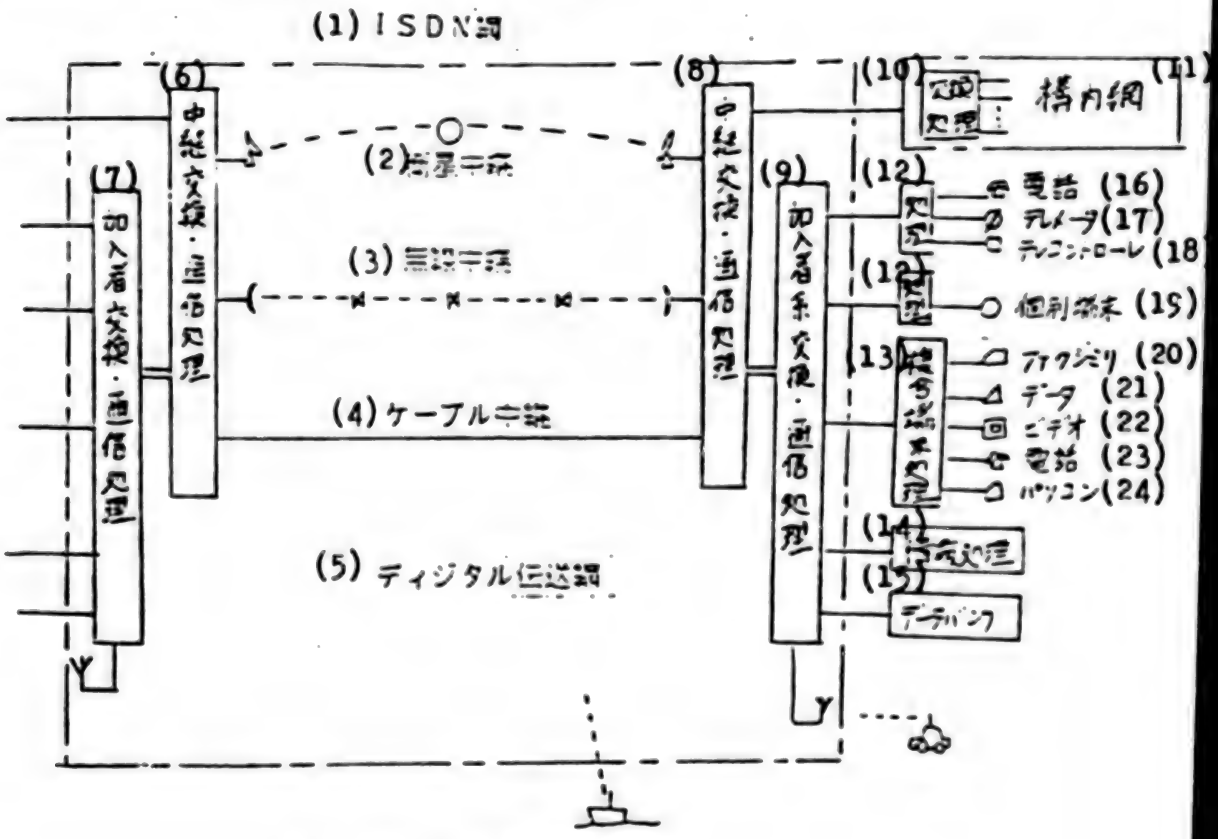
Utilization efficiency can be improved through abandoning the conventional approach of using separate networks for different operations, and instead jointly using an integrated network. A conceptual diagram of an integrated digital network is given in Figure IV-2-2.

Figure IV-2-1 Conceptual Diagram for Exchange & Transmission Using Multiple-Speed Circuits



図Ⅳ－2－1 多元速度回線の交換，伝送の概念図

Figure IV-2-2 Conceptual Diagram for ISDN



図Ⅳ－2－2 ISDN網の概念図

Key to Figure IV-2-1:

1. Image
2. Time-sharing-supporting multiplex processing
3. Telephone
4. Data
5. Facsimile
6. High-speed data [illegible]
7. Telephone
8. Digital transmitter
9. Low-speed data [illegible]

Key to Figure IV-2-2:

1. ISDN network
2. Satellite relay
3. Wireless relay
4. Cable relay
5. Digital transmission network
6. Relay exchange & communications processing
7. Member exchange & communications processing
8. Relay exchange & communications processing
9. Member-system exchange & communications processing
10. Exchange, processing
11. Internal network
12. Processing
13. Complex terminal processing
14. Data processing
15. Data bank
16. Telephones
17. Telemetry
18. Decontrol
19. Separate terminals
20. Facsimiles
21. Data
22. Video
23. Telephones
24. Personal computers

(d) Expansion of Such Communications Types as Telephone, Data Communications, and Video Communications

By converting to digital networks, all of the various new types of communications which will be demanded in the future can be easily implemented.

(e) Facilitation of Easier Connection & Processing Between Dissimilar Communications Terminals

Even within the same industry, there are separate transmission speeds and control procedures for data communications, facsimile transmission, and video communications, etc. There are also both digital and analog terminals.

The integrated digital network will make it easy to mutually interconnect these communications terminals.

(The foregoing are benefits of service integration.)

2.2 Current State of Public Telecommunications Networks

(1) Research Trends in CCITT

In ISDN research within CCITT, an international consensus has been obtained in using 64k b/s for the basic communications carrier. A study agenda has been drafted which encompasses service types, member-system signal modes, member transmission speeds, and service quality. Discussions have been conducted on customer connections for the purpose of digitalizing member lines and rendering all kinds of operations compatible.

In 1980, based on the results of this research, Advisory G.705 was drafted, setting forth the basic principles of ISDN. This advisory outlined the ISDN concept and gave direction to future research. Its main provisions are outlined below.

(a) ISDN should be based on digital telephone networks, and provided with the functions of other dedicated networks (data networks, etc.) as it is being formed.

(b) The greatest feature of the ISDN is in its implementation of both telephone and non-telephone services with a limited number of multipurpose-business terminal-network connections. The implementation of these terminal-network connections is the key to service integration.

(c) It is desirable that new services incorporated into ISDN be compatible with 64k b/s exchange connection.

(d) Since it will take a long time (20 years, for example) to move to ISDN, interconnection with existing networks during that time is important.

(e) ISDN should have processing functions (intelligence) for the purpose of enhancing operation-correspondence functions and providing for conservative operation.

(f) Besides 64k b/s, intra-network signal carrier speeds of 8k, 16k, and 32k b/s should also be provided so as to conform to various high-speed (broad-band) services.

(g) Packet exchanges should be included as well as circuit exchanges.

(h) Attention should be given not only to the all-digital age, but also to analog-digital mixed connection (hybrid access) modes in consideration of the time required to convert from existing analog networks.

(i) ISDN should be implemented with various formats to conform with the conditions in various countries and with plans for converting to domestic networks. Accordingly, in the initial stage of conversion to ISDN, there will be cases of overloaded terminal-network connections due to the early utilization by operations employing digital signals.

In this manner, ISDN will become increasingly practical and broad-based while maintaining a framework of connecting via certain specified digital signals.

ISDN will not become a static entity in the future, but will probably develop and expand together with technological progress and changing demands.

Trends for communications operations in advanced countries have recently been changing at an extremely rapid pace, and now involve even broader trends than those given above for CCITT.

(2) Domestic Trends

At the present time, domestic public communications are handled monopolistically by Nippon Telegraph & Telephone Public Corporation (NTT), and international public communications by Kokusai Denshin Denwa KK (KDD). Research and development is being done on digitalization and service-integration in transmission routes, either in coordination with international trends with respect to ISDN, or in keeping abreast of trends in user needs.

When NTT was first formed as a public corporation, its two great initial objectives were to implement nationwide instant automatic service and to eliminate stratification-stagnation on a nationwide scale. Since achieving these objectives in 1979, and following the decade of research done on integrated communications networks for various operations that began in

the late 1960's, the corporation has set forth as new objectives the implementation of ISDN and the realization of information-volume [illeg.] which focuses on the possibility of measuring information which has been digitalized. NTT is now engaged in R&D on technologies and systems for implementing a high-level information system which will be efficient and handle all the new telecommunications operations in an integrated manner. This system is called INS (information network system), and is targeted for completion in 20 years.

The first experimental INS system is scheduled to begin services in the Mitaka area in the fall of 1984, and it is believed that conversion of communications systems to ISDN will proceed at a rapid pace in the future.

Since international communications networks involve joint operations by many countries, the larger differences in sophistication and speed are between regions rather than between countries. Accordingly, it is predicted that future international communications networks will develop in such a manner that many different types of service network will be [illegible], and facilities will be jointly used in a multi-level way, or else mutually connected. Based on this outlook, following the digitalizing of its transmission routes and the implementation of the VENUS-P service with a packet-exchanging public data network, KDD is now studying the implementation of non-telephone public network services such as a circuit-exchanging public data network, telex network, and message-exchanging network.

(3) Trends in Foreign Countries

With the decision in the Carter-Horn case in 1968, it became possible in the United States to connect various kinds of terminals to communications lines. Since then, some progress has been made in integrated communications involving separate digital microwave communications facilities.

In 1980, a decision was reached in the FCC's second major computer trial, and with the recent entries into the value-added-communications and new-media markets as a result of the divestiture and reorganization of American Telegraph & Telephone Company (AT&T) and IBM's entry into the communications field, the conditions are ripe for converting communications networks to ISDN.

France has named its new non-telephone multiple-type communications system "Telematic," is promoting it as a major national project, and has installed the "Biaritsu" [phonetic] communications network. West Germany has implemented BIGFON, and is working hard to achieve an integrated network that will comprehend telephones, television phones, facsimile operations, data transmission, and radio and television broadcasting.

The United Kingdom has revolutionized its communications systems with "British Telecom" (BT) and "Mercury Communications."

The countries of northern Europe are also installing digital microwave facilities, improving the reliability of their communications circuits, and gearing up to cope with greater diversification. All of these countries have begun preparing for ISDN.

2.3 Self-Managed Communications Systems and ISDN

Since self-managed communications systems involve facilities that are used by the parties who installed those facilities, they feature poor general compatibility and low communications traffic as compared to the public telecommunications systems which are jointly used by the general public.

Nevertheless, with the introduction of computers for the purpose of rationalizing businesses and the promotion of office automation (OA), the communications services supported by the self-managed communications systems are also becoming more diversified with respect to both data and facsimile images.

Also, as public telecommunications systems move toward ISDN, and terminals are introduced having sophisticated functions, it will become more economical to promote joint utilization with the terminals of the self-managed systems.

Under the present system, from the standpoint of maintaining high quality in the public telecommunications networks, there are severe limitations on what can be connected to those networks. However, if it becomes possible to standardize the technological conditions with respect to connecting terminals to communications networks and guarantee conformity with those conditions, then it will probably become possible for self-managed communications systems to connect to public telecommunications networks and to interconnect with other self-managed systems.

A telecommunications business bill is now in committee in the Diet, and it is likely that connection with public telecommunications networks will be widely promoted.

A high proportion of the communications signals of self-managed communications systems is made up of various non-telephone signals, and the volume of traffic for each of these signals is lower than the volume on public communications circuits. Accordingly, there is great advantage in the move to ISDN for self-managed systems which conduct communications between local area networks (LAN's) that are constructed as integrated communications networks. (More on LAN's below.) It is very likely that these systems will grow faster than the public communications networks.

2.4 ISDN and Wireless Communications Circuits

(1) ISDN's Enhanced Reliability

As discussed in Chapter 3, with respect to the extra-municipal transmission circuits in Japan's telecommunications networks, the strengths and weaknesses of cable and wireless systems are combined so as to be mutually complementary, and efforts have been made to build communications networks with high reliability to cope with the activity of nature and the activities of a densely populated society. We have achieved circuit stability and reliability by making the wire/wireless ratio about 50 percent in the extra-municipal relay circuits for toll centers and above in the public communications networks.

In the public-works communications circuits, cable-based and other wire-based communications are employed, but wireless communications systems are more predominately used, and communications stability and reliability are greatly dependent on wireless communications.

In the future information society, it is clear that social activity and social stability itself will be more strongly affected by telecommunications. Also, in order to promote and maintain a high-level information society, it will be necessary to build highly reliable communications networks which have no regional variation and which can cope with the demands for various new means of communication (new media).

ISDN-type wireless circuits can play a large role in the realization of such high-level communications networks.

Turning our focus to the international scene, the United States leads the world in developing microwave communications and has built microwave communications networks. In the wake of the 1968 Carter-Horn decision and the 1969 MCI decision involving the Federal Communications Commission (FCC), progress has been made in building digital microwave communications circuits. Meanwhile, digital microwave facilities are also being built in the United Kingdom and northern Europe as communications systems become more sophisticated in those regions too.

(2) CCIR Recommendations for Digital Wireless Relays

Studies are being done in the CCIR on digital systems for wireless and satellite relays as progress is made toward ISDN, and many recommendations and reports concerning digital wireless systems were adopted in the 1982 general assembly.

Recommendations were made for medium- and large-capacity digital wireless systems in frequency bands of 10 GHz and below, 11 GHz, 19 GHz, and 20 GHz, and for small-capacity digital systems in the frequency bands of 2

GHz, 10 GHz, and 13 GHz. The modulation modes for the medium/large-capacity systems at 10 GHz and below are 16QAM and 8PSK.

Also adopted were recommendations for systems used in trunk-line-connecting terminal circuits and member concentrator wireless circuits for bands 8 and 9 and the semi-milliwave bands of 25 GHz and 40 GHz. Studies are being done on digital wireless systems which include member terminals as well as trunk-line relay circuits, and progress toward ISDN is being achieved.

(3) Accommodating Terminal Circuits

With the rapid advances being made in data communications, the necessity of ISDN is becoming broader, covering everything from one terminal to the next in communications networks. In coping with this rapidly increasing demand, it is possible that digital wireless [illegible] circuits will play a role in the construction of future high-reliability communications networks.

Various systems can be considered for terminal wireless circuits, and circuit configurations are indicated by category in Figure IV-2-3. These terminal circuits differ according to the proportion which they account for in circuit networks and in terms of the kinds of topography they are addaptable to. Connection to relay circuits is by traffic center (MTC), as shown in the figure.

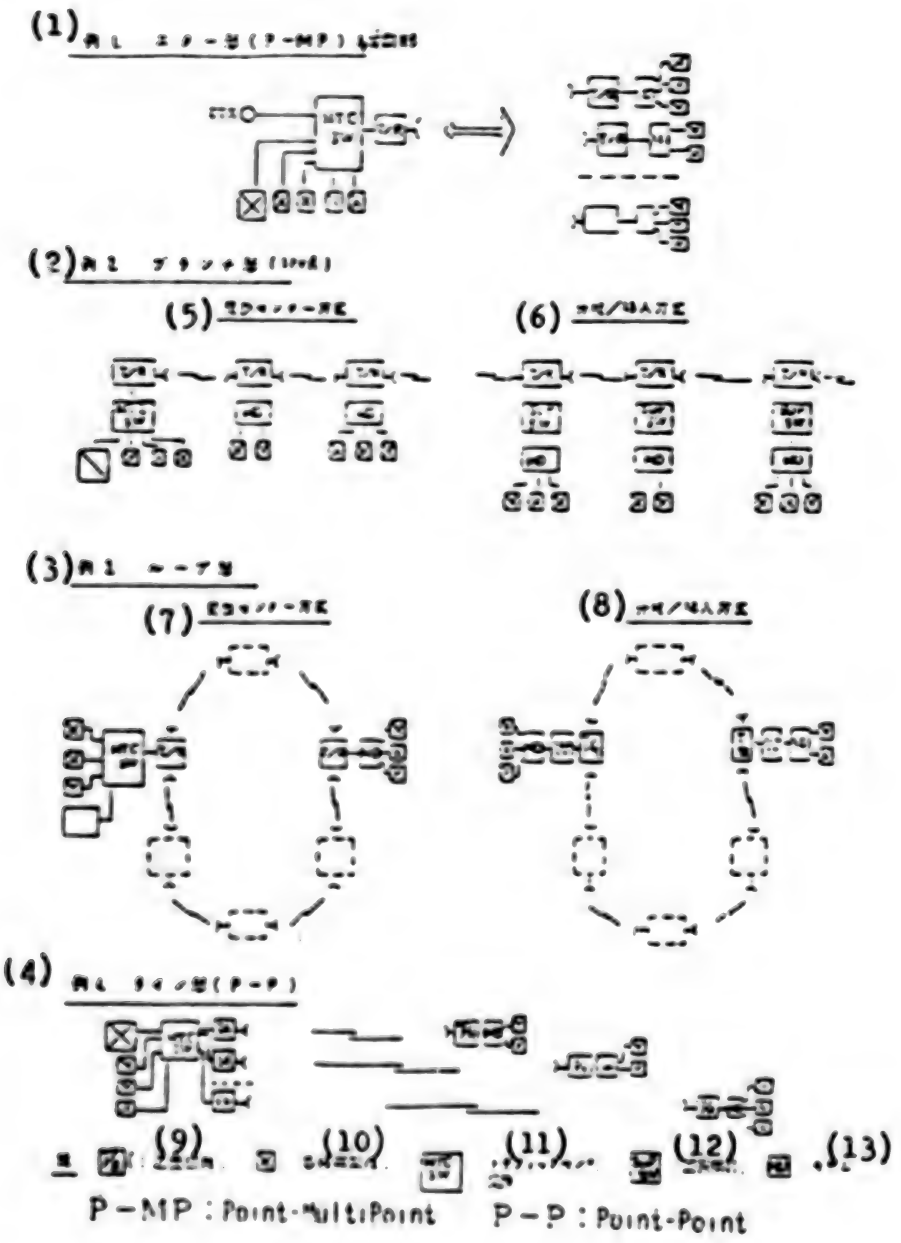
2.5 Future Outlook for ISDN

The implementation of ISDN will result in lower information transmission fees by consolidating the telephone, telegraph, facsimile, and data communications networks (conventionally structured as separate networks), and by integrating exchanges, connection processing, and transmission routes and using them for various different operations. The digitalization of telecommunications networks and the achievement of transparency for various information signals will also facilitate greater diversification in the utilization of terminal equipment.

This has the potential of fundamentally altering the overall telecommunications system which conventionally was based on hardware limitations and which includes broadcasting and cable television as well as telecommunications in the narrower sense which includes telephone and telegraph communications. This will also have a large impact on such fields as mail, newspapers, and magazine and book publishing, which had been thought unrelated to telecommunications.

When ISDN comes fully of age, telecommunications will not be limited to remote communications means between private parties, but new and unprecedented ways will become available for promoting social welfare, education, and culture, and for eliminating regional limitations.

Figure IV-2-3 Terminal Circuit Configurations



図Ⅳ－2－3 端末回線の構成形式

Key to Figure IV-2-3:

1. Example 1: Star format (P-MP) , multi-directional
2. Example 2: Branch format (spur)
3. Example 3: Loop format
4. Example 4: Line format (P-P)
5. Exchange center method
6. [Illegible] method
7. Exchange center method
8. [Illegible] method
9. [Illegible]
10. [Illegible]
11. Traffic center [illegible]
12. [Illegible]
13. Modem

In order to implement this kind of ISDN, the following themes must be researched.

(1) Comprehending Demand Trends

The configuration of telecommunications networks depends basically on the kinds of communications demanded and traffic volumes. In particular, the demand for video communications is expected to be very important and have a major impact on systems.

(2) Communications Network Transparency and Terminal Processing Functions

It is necessary to build telecommunications networks which can flexibly cope with diversifying communications needs. Another approach toward simplifying and economizing terminal equipment and expanding their range of connectability is to provide telecommunications networks with broad processing functions. Modern electronics technology, meanwhile, is making it possible to provide terminals with high-level processing functions without involving large economic burden, and what users are demanding in their terminal equipment is rapidly changing. In such a context as this, we must avoid inflexibility in future communications networks with respect to evolving terminal equipment by providing these networks with such basic communication-processing features as exchanges, transmission, multiplexing, and speed conversion, and by achieving network transparency with regard to various signal types. We must also give due consideration to user convenience and economy concerning terminal equipment for exchange and connection between different systems (as, for example, between pattern systems and code systems for text communications).

With respect to the relationship between the economies effected in data communication systems overall and the achievement of ISDN flexibility in the future, it is desirable that terminals also be equipped with service

processing functions incidental to other operations, and, as terminal equipment becomes more diversified, that terminals themselves be able to provide the processing for connection functions. Some things which will be important here are exchanges with other terminals having different performance characteristics, standards, and communications restrictions (such as with CRT displays and copiers), connection ranges, and the enhancement of complex terminal functions which will be shared with dissimilar operations. We have an obligation to provide users with terminals which, in these respects, are economical and convenient to operate.

(3) Compatibility with Existing Networks

Since a long time will be required to implement ISDN, adequate consideration must be given, in the transition stages, to compatibility with existing networks.

Also, from the perspective of radiowave use, many themes require to be surveyed and researched.

(4) High-Speed Transmission

With ISDN, since various services will be consolidated for transmission, the transmission speeds required for relay circuits will be [illegible] high speed. Accordingly, it will be necessary to implement high-speed transmission modes in wireless relays by employing multiplexing modulation technology and high frequency bands.

(5) Digitalization of Mobile Communications

It is predicted that communications demands for mobile units will not be limited to telephone communications, but will broaden to include various types such as facsimile and data transmission. In order to integrate these services, mobile communications routes will have to be digitalized. It will also be necessary to consider the connection between higher transmission speeds and the propagation characteristics of mobile communications, and there is a need for technologies to accomodate signal processing and modulation/demodulation for bo-rate regions and band-width compression.

(6) Communications Stabilization and Terminal Circuits

As the traffic volume on communications circuits becomes larger, the effect which malfunctions have on the communications system and on social activity becomes larger too. Also, single-circuit communications for system terminals can result in injury to local society by isolating it or delaying responses to accidents or calamities.

It is therefore necessary to promote the realization of an information society by building dissimilar communications systems using the characteristics of radiowaves, in addition to cable-based systems, thereby assuring communications stability and eliminating regional limitations.

(7) Accommodations to New Media

Research and development must be directed toward wireless systems that will meet the demands for new means of communication (new media) which cannot be easily met using cable-based systems.

3 Local Networks

In this section the term "local network" refers not to a closed regional communications network within an organization, but a circuit network that handles the communications carried on inside a single building or factory.

Nevertheless, it is only natural that some fraction of this communications will of necessity have to be tied into communications facilities outside the local network.

3.1 Background of Local Network Development

In recent years, in conjunction with the rapid advances in electronics, such data processing machines as computers, data terminals, facsimile machines, word processors, and personal computers have been placed in offices, research laboratories, and business locations. Moreover, as the number of these units has increased, there have been increasing cases of interconnecting these units via communications lines to facilitate using them as systems and thereby adding to their stand-alone functions.

Meanwhile, according to surveys done on office automation (OA), it is said that intra-facility communications accounts for more than 60 percent of all industrial communications, which is a very high proportion.

Against this background, as OA has progressed, the local telephone networks based in the past on the PBX (private branch exchange) have begun to change very rapidly.

In particular, in recent years we have seen the appearance of intra-facility communications circuit networks (LAN's as narrowly defined) made up of various types of transmission routes based on new technology, and also local networks based on digital electronic private branch exchanges (EPBX's). In this way, the integration of various intra-facility communications operations is proceeding at a rapid pace.

3.2 Local Networks & Technological Development

In recent years, local networks have exhibited increased diversification in terms of the types of equipment connected and the technologies employed.

The combinations of equipment which can be connected via a local network, and the communication speeds required therefor, are such as the following.

(1) Computer-to-terminal and terminal-to-terminal communications; in general requiring a low-to-medium speed of 9.6k b/s or lower.

(2) Mainframe-to-minicomputer and mini-to-mini communications; requires high-speed communications of several hundred kb/s or above for intercommunications between data processing systems.

(3) Intercommunications between office computers, minicomputers, and personal computers; requires communications speeds on the order of several tens of kb/s.

(4) Communications between controller and work stations; required communications speeds vary greatly, from several kb/s to several million b/s, depending on the distribution of functions between the end points.

(5) Telephone, facsimile, and word-processor communications; requires communications speeds of several tens of kb/s or lower.

There are thus many kinds of combinations of connections.

The approach to the configuration of a local network will vary depending on the user--whether the factory of a mass producer of automobiles, chemicals, or steel, or the plant of a multi-product-model manufacturer of communications equipment, computers, or components, or a research facility, or the offices of a large diversified trading company (sogo shosha)--but the following two trends may be considered.

(1) Local networks that develop based on data communications

(2) Local networks that develop based on voice and facsimile communications

Coaxial cable has conventionally been widely used for intra-facility communications circuits, but optical-fiber cable and wireless circuits have now also come into use.

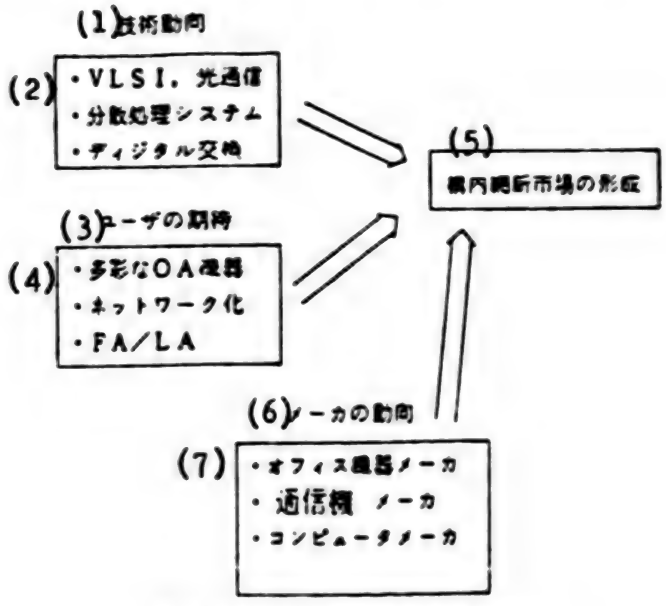
For connection control, the PBX has been used in conventional networks based on voice communications, but, as data communications have increased, the EPBX has come into use. An even more recent development is the

utilization of time-slot-distribution-control-type connecting equipment for the purpose of integrating various kinds of communications.

(1) Conditions Affecting Local Networks

As shown in the following figure, a new market is now being formed for local networks as a result of the combined interaction between technological trends, user expectations, and manufacturing trends.

Figure IV-3-1 Formation of New Market for Local Networks



図Ⅳ－3－1 構内網新市場の形成

Key:

1. Technological trends
2. • VLSI, optical communications
   • Decentralized processing systems
   • Digital exchanges
3. User expectations
4. • Diversified OA equipment
   • Network implementation
   • FA/LA
5. Formation of new market for local networks
6. Manufacturing trends
7. • Office machine manufacturers
   • Communications equipment manufacturers
   • Computer manufacturers

Many local networks have already been implemented in the form of computer networks inside universities and research facilities, and in the form of production control networks inside factories. These networks are contributing greatly to LA (laboratory automation) and FA (factory automation).

From the perspective of enhancing office productivity, increased use of OA-oriented local networks is expected for the future.

(2) Classification of Local Networks

Local networks can be classified according to the three major factors of network format (topology), exchange mode, and transmission medium, as shown in the following table.

Table IV-3-1 Three Criteria Used in Local Network Classification

Item	Content
Network format (topology)	Star, link, loop, bus
Transmission medium	Double stranded wire, coaxial cable, optical fiber, wireless (radiowave)
Exchange (media access) mode	Circuit exchange, packet exchange (CSMA/CD, token packet)

With respect to the communication speeds demanded by intra-facility communications circuits, there are the transmission speeds which arise from the various types of communications, and the communication speed required to integrate all of these and transmit them becomes higher. In actual practice, various types of transmission routes are employed, depending on the implementation conditions and technological level. The cable media are as shown in Table IV-3-2.

As for wireless media, any of the communication speeds indicated in Table IV-3-2 is possible, but these are determined in the process of apportioning radiowave utilization bands.

3.3 Local Networks & Radiowave Utilization

It is believed that local networks will be widely used in all production fields in the future, as indicated in Table IV-3-3.

With respect to local networks, the following diverse uses of radiowaves are possible.

(1) Local Networks Within Large University Campuses and Construction Sites

It is here necessary to join many different buildings with a data communications network, and it is possible that there will be increased

Table IV-3-2 Non-Wireless Transmission Media & Characteristics

Media	Maximum Comm Speed (Major)	Comm Distnc	Number of Branches	Cost per meter (unit = Yen)	Characteristics
Double stranded wire	56 kb/s	1 km	32 - 200	300 - 2000	Inexpensive, easy to install
Baseband coax cable	50 Mb/s	3 km	64 - 1024	2000 - 3500	Reliable, flexible, and economical
Broadband coax cable	350 Mb/s	10 km	200 - 2400	2000 - 3500	Ideal for bus structures (supports bidirectional transmission of electrical signals)
Optical fiber cable	800 Mb/s	10 km	2 - 8	1500 - 6000	High-speed transmission, resistant to noise, ring format, many uses

Table IV-3-3 Applications Fields for Local Networks (Examples)

System Topology	Application Field	Suitable Locations	Main Connecting Equipment
Local networks based on host computer	Inter-computer communications, transaction processing, TSS, RJE, file transfer, CAD/CAM, voice processing	Factory premises, universities/research labs, large offices (inside building)	Computers, OA equipment, TSS, RJE terminals, on-line terminals, CAD/CAM
Local networks which connect OA equipment	Office systems, text processing, electronic mail, filing	Offices, banks, department stores, volume sales outlets	Word processors, personal computers, office computers
Local networks which connect FA and LA equipment	Production control systems, measurement control systems, testing systems, FMS	Factory premises, universities, research laboratories	Production control terminals, measuring equipment, NC machines, robots
Local networks which connect monitoring & control equipment	Centralized monitoring & control systems (building administration, fire prevention, operations & service control)	Roads, airports, subways, LNG depots, water purification plants, atomic power plants	Monitoring & control equipment, telephones, broadcasting, video

utilization of milliwave and sub-milliwave facing circuits to cope with the topography and with internal and external obstructions on the premises.

(2) Monitoring & Control Systems

It is possible to use radiowaves for remote telecontrol circuits where centralized monitoring & control systems are implemented for several buildings.

In particular, we will probably see more high-reliability systems constructed by using radiowave circuits in conjunction with cable systems which are subject to cable breaks.

(3) Mobile Communications

As local networks expand and proliferate, it is predicted that terminal nodes using wireless [illegible] will be widely used as well as those in which the terminal nodes are fixed. To these nodes are connected terminals via cable systems and mobile terminals via [illegible] systems, but the utilization of mobile terminals will probably increase due to their mobility. For example, it is possible to set up communications facilities on [illegible] premises or in temporary convention halls, without laying optical fiber cables, etc., by establishing nodes in any desired location, and conducting mobile voice communications, facsimile transmission, and data transmission to computers, etc. If moving-picture video information is to be transmitted from mobile terminals, this requires transmission on wide bands of several MHz, so it will be necessary for the future to study the use of mobile communications using frequencies of several GHz or higher, in the milliwave bands, or using optical communications.

There are many merits in using wireless circuits in local networks, such as freedom in selecting installation locations and in connecting to widely scattered nodes, and in making mobile terminal applications, but, on the other hand, it will also be necessary to study ways of dealing with the problems which will inevitably arise from using radiowaves, such as local interferrence and information security.

(4) Interconnections Between Local Networks

As the use of local networks progresses, it is thought that needs will arise to connect remotely separated local networks and thereby widen the scope of data communications.

In this connection, it is believed that electronic mail, data communications, and teleconferences will be conducted between widely scattered buildings.

The following three methods are possible for interconnecting local networks.

(a) Interconnect by connecting with public communications networks.

(b) Interconnect by connecting with privately-managed communications networks.

(c) Interconnect by mutually linking some local networks which are in close proximity to one another.

(5) Radiowave Frequencies Used in Local Networks

In general, local networks encompass narrow areas, making them ideal for the use of sub-millivave and millivave bands, and leakage cables are also used.

It is also necessary to promote research and development in using these frequencies for local mobile communications.

Interconnections between distantly separated local networks is being done by cable-based and fixed-wireless communications media in public and privately managed networks.

V Outlook for Radiowave Use

1 Conclusion

Considered internationally, Japan is one of the most advanced nations in the field of radiowave utilization. For the past several years we have led the world in developing uses for new frequency bands.

At the 1979 World Radiocommunications Administrative Agency Conference, the nations represented revised the Frequency Distribution Table of the Radiocommunications Regulations in the interest of coping with changes in demand for radiowave utilization during the next 20 years. Domestically, the "Frequency Apportioning Principles" were revised, and, based on this revision, radio stations were assigned frequencies effective January 1, 1982. In this chapter we week to give an outlook for radiowave utilization in all fields of telecommunications, based on what was said in Chapters II and IV on recent developments in radiowave utilization technology and demand trends, and also suggest some guidelines for the future.

In thinking about the state of radiowave utilization, the following points are basic.

(1) Obtain the maximum volume of data transmission using the frequency spectra which can be utilized.

(2) Enhance the reliability of communications in the information society.

(3) Seek to maximize the joint use of frequencies and the effective utilization of frequencies in various kinds of wireless operations.

(4) Promote the advancement of the information society by making early use of new communications means (new media).

From this standpoint, it is necessary to promote radiowave utilization in all wireless operations. We explain each point in greater detail below.

Point (1): It is possible to increase the proportion of wireless communications in telecommunications overall by obtaining maximum data transmission volumes, and to provide benefits to society by developing and extending radiowave utilization.

Point (2): In the coming information society which will be based on social activities which are joined via various kinds of data and information communications, communications reliability will become a much more critical factor than it has been in the past, and we need to consider this point well. Compared to communications and broadcasts based on communications routes which are connected via metallic or optical-fiber cables, communications and broadcasts conveyed by radiowaves involve different trouble-causing modes and have a lower frequency of loss. The reliability of communications circuits can be raised by employing both wireless systems and cable systems (which are not subject to radiowave spectrum restrictions) together so as to complement each other's weaknesses and strengths.

Point (3): Since radiowave spectrum space is limited, the effective use and joint use of frequencies is strongly desired for all wireless communications implementations. These objectives will be realized by means of original information signal processing, band-compression technology for modulation/demodulation, interferrence tolerance and elimination technologies, and frequency joint-use technology. As discussed in Chapters II and III, there are now large gaps in the levels of these technologies from one business to another, but great progress is expected for all businesses as further advances are made in LSI, electronic-circuit, and processing technology and in digital technology.

Point (4): The implementation of the information society is largely controlled by terminal equipment, processing conditions, and exchange/connection technology, but, compared to cable systems, the use of radiowaves in information transmission fields is generally superior in terms of flexibility, construction time, and economy. Radiowave utilization will be especially effective in promoting the development of the information society in cases of demands for new communications means (new media) which

cannot readily be met with conventional facilities. It will also be necessary to cope with increased demand for mobile communications.

By making the above points clear and promoting radiowave use, in the international arena where many different measures can be taken, it is possible for radiowaves to play a leading role and contribute greatly. Consideration must also be given to opening up ways of aggressively using conventionally unused frequency bands in various operations.

In the following sections we look at the future of radiowave utilization for each kind of business in turn.

2 Fixed Communications

2.1 Introduction

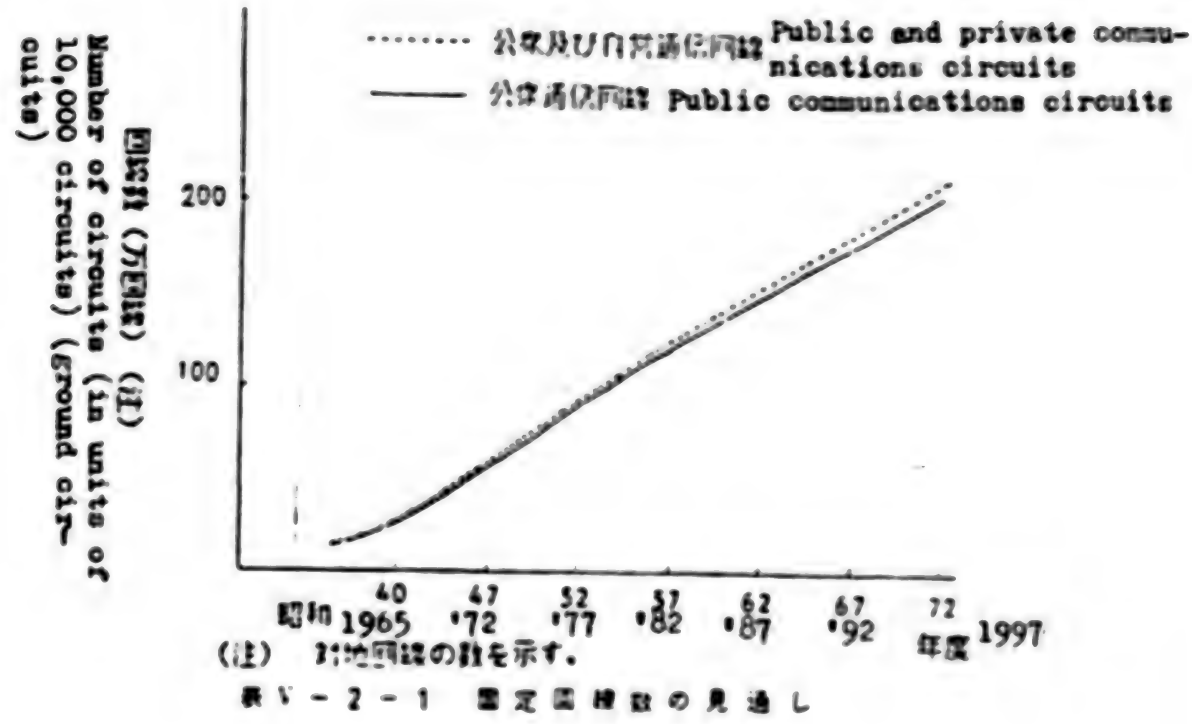
Fixed communications circuits consist presently of public communications circuits and privately managed communications circuits, but public communications systems account for a greater number of circuits. In the future, the predominant position of public communications circuits is not expected to change, even if the exact proportion does change. Fixed communications transmission routes for public communications are made up of wireless transmission systems and cable-based transmission systems, with the former made up in turn of fixed land-cable systems and satellite communications systems. At the present stage of development, the volume of communications accounted for by satellite communications is still relatively small, but the further development of satellite communications will not only contribute greatly to transmission volumes for fixed communications overall, but it is believed that this will change the complexion of wireless transmission systems overall, making networks easier to use by taking advantage of features not provided by fixed land-based wireless systems such as distance-difference equalization, circuit installation flexibility, and high reliability. Meanwhile, the advantages of the latter are becoming more evident with the developments in optical-fiber transmission. Projected numbers of fixed circuits are graphed in Figure V-2-1. A comparison of features for fixed transmission systems is given in Table V-2-1.

2.2 Fixed Communications--Current State, Trends

The use of communications between fixed ground points has been increasing even more rapidly in recent years as it has been used to rationalize industry and reduce manpower required by business.

Public communications circuits are adequate for most of these applications, but privately managed communications circuits are installed in public-use fields such as national land preservation, fire-fighting, disaster prevention, law enforcement, local government, meteorology, maritime safety, air traffic control, railroads, and electric power, where

Figure V-2-1 Projection of Numbers of Fixed Circuits



(注) 対地回線の数を示す。

表Ⅴ－２－１ 固定回線数の見通し

Table V-2-1 Comparison of Features of Fixed Transmission Systems

表Ⅴ－２－１ 固定伝送方式の特徴比較

比較項目 ＼ (1)伝送方式種＼ (5)	(2) [illegible]定無線伝送方式	(3) 固定衛星通信方式	(4) 光ファイバ伝送方式
(6) 大容量	○	△	◎
(7) 経済性（２地点間当）	○	△	○
(8) 耐災害	○	○	△
(9) 回線設定の柔軟性及び[illegible]	○	○	△
(10) 広域	×	○	×

Key to Table V-2-1:

1. Transmission system [illegible]
2. Fixed wireless transmission systems
3. Fixed satellite communications systems
4. Optical-fiber transmission systems
5. Items compared
6. Large capacity
7. Economy (transmission between two land points)
8. Earthquake resistance
9. Flexibility and adaptability of circuit installation
10. Wide range

urgency is demanded for the preservation of life and property, where high-level security and reliability are required, or where promptness or safety are required.

The following discussion focuses on public communications, which accounts for the major portion of the transmission volume for fixed communications circuit networks.

(1) Current State of Public Communications

As our societies further develop, the increase in fixed communications circuits is dramatic. With respect to domestic public communications, intertoll telephone trunk lines had reached approximately 276 million CH-km at the end of fiscal 1981, divided roughly evenly between wireless systems and cable systems. Long-distance intertoll trunk trends are indicated in Figure V-2-2. With respect to international public communications, there were roughly 2,700 international telephone circuits at the end of fiscal 1982, with the ratio between satellite circuits and submarine cable circuits being roughly 2 to 1. The trends for international telephone circuits are charted in Figure V-2-3.

A Wireless Systems

(a) Analog Systems

The 4, 5, and 6 GHz bands are mainly used for long distance communications, with the typical systems being the 1800 CH system (6 GHz), 2700 CH system (5, 6 GHz), and 3600 CH system (4, 5 GHz), as well as systems supporting mixed television and telephone transmission (4 GHz). Also implemented is the large-capacity 5400 CH system which uses the SSB mode.

The 2, 11, and 15 GHz bands are mainly used for short distance communications. Typical systems are the 600 CH system and 960 CH system in the 2 GHz band. The 15 GHz band is used in cases where the

11 GHz band cannot be used due to interferrence, etc., with the same systems as for the 11 GHz band.

(b) Digital Systems

As long-distance systems there is the 400 Mb/s system which uses the 20 GHz band, and a relay-distance 200 Mb/s system (the same as existing analog systems) has been implemented using the 5 GHz band. Also planned is the implementation of 200 Mb/s systems in the 4 and 6 GHz bands, the same as in the 5 GHz band.

As for short-distance systems, 3 Mb/s and 12.6 Mb/s systems have already been implemented in the 2 GHz band, and a 32 Mb/s system is planned. Also, 65 Mb/s and 100 Mb/s systems are implemented in the 11 and 15 GHz bands, and implementation of a 200 Mb/s system is planned. Typical system specifications are given in Table V-2-2.

B Cable Systems

(a) Analog Systems

As typical land coaxial-cable systems, there are 12 MHz systems (2700 CH) and 60 MHz systems (10,800 CH), which are implemented mainly as transmission routes for levels at or above toll centers. As submarine coaxial-cable systems, there are the 10 MHz (900 CH) and 36 MHz (2700 CH) systems for short distances, and the 36 MHz system (960 CH telephone + 2 CH/2700 CH television) for long distances. A short-distance carrier system has also been implemented for balanced-pair cable applications.

As typical international submarine coaxial-cable systems which reach Japan, there are 12 MHz (1600 CH) and 36 MHz (2700 CH) Japanese systems, an American system (845 CH), and a West-German system (120 CH). These submarine coax cables connect Japan with the United States, Korea, Hong Kong, and the Philippines.

(b) As coaxial-cable systems, 100 Mb/s and 400 Mb/s systems have been implemented, primarily for transmission routes at or above the level of toll center. A 1.5 Mb/s system has been implemented for balanced-pair cable applications for short-distance communications.

As transmission systems using optical-fiber cable, 32 Mb/s and 100 Mb/s systems have been implemented, and work is moving ahead to implement a large-capacity 400 Mb/s system as well as 6 Mb/s and 1.5 Mb/s systems for short distances. Optical-fiber cable transmission systems suitable for underwater use are also being planned having the same transmission capacities as those used on land.

Work is also going ahead in Japan, the United States, the United Kingdom, and France on international digital optical undersea cable systems. Japan is in the final underwater-testing stage with a 280 Mb/s system. Also, in the interest of the more efficient development of submarine cable technology, technological cooperation is being achieved between international and domestic public communications.

Typical system specifications for the above are given in Table V-2-3.

C Satellite Communications Systems

The CS-2 is Japan's first communications satellite for handling domestic communications.

The CS-2 carries six Ka-band (30/20 GHz) relay systems and two C-band (6/4 GHz) relay systems. Four systems and two systems, respectively, convertible to 3000 telephone circuits, are used for public communications, and for island communications, extraordinary communications, and disaster control. New services are also being planned which take advantage of the characteristics of satellite communications.

Specifications for the domestic fixed communications systems now implemented are given in Table V-2-4.

International satellite communications became commercial with the Intelsat (International Telecommunication Satellite) system in 1965. Since then, development has been rapid, with 131 countries now using satellite communications, representing approximately 32,000 voice-class circuits. Satellite television transmission is also conducted on a wide scale. As of March 31, 1984, there are two Mark IV-A satellites and seven Mark V satellites being used for international communications in the Intelsat system. Specifications for these satellites are given in Table V-2-5.

Maritime satellite communications got underway in 1976 with the Marisat system. This was superseded in 1982 by the Inmarsat system. As of March 31, 1984, there are five of these satellites positioned so as to cover the Atlantic, Indian, and Pacific ocean regions, which are used by 2,271 ships from 56 nations. Three types of satellite are used in these operations, namely the Marisat, Marex, and Intelsat Mark-V MCS satellites. Specifications for these satellites are given in Table V-2-6.

(2) Public Communications Trends

The digitalization of communications networks is proceeding at a rapid pace in order to cope with increasingly sophisticated and diversified communications needs. In this context, a major shift is occurring, away from conventional analog-system planning and toward digital-system planning.

Figure V-2-2 Total Distance Trends for Domestic Public Microwave Circuits

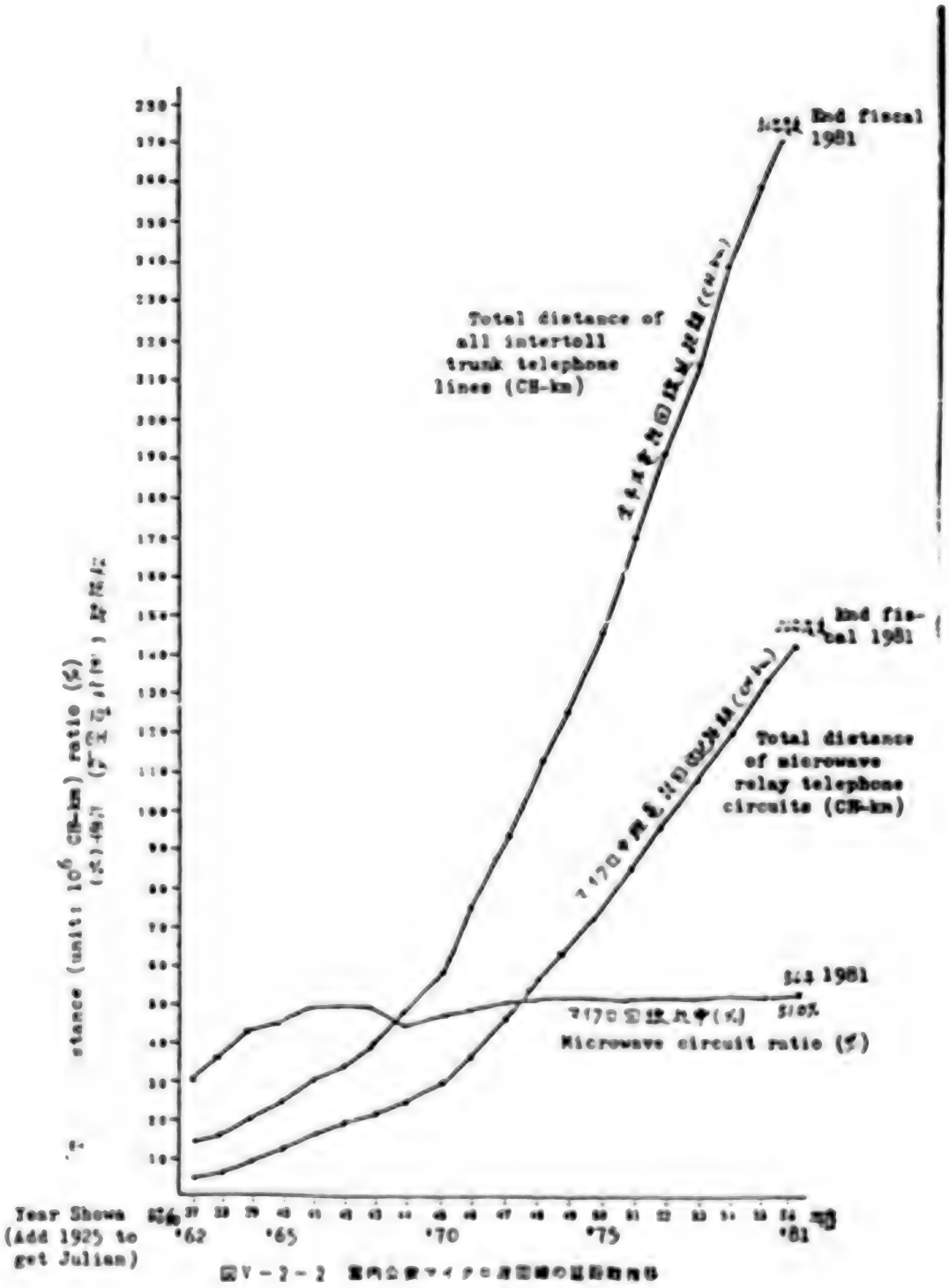
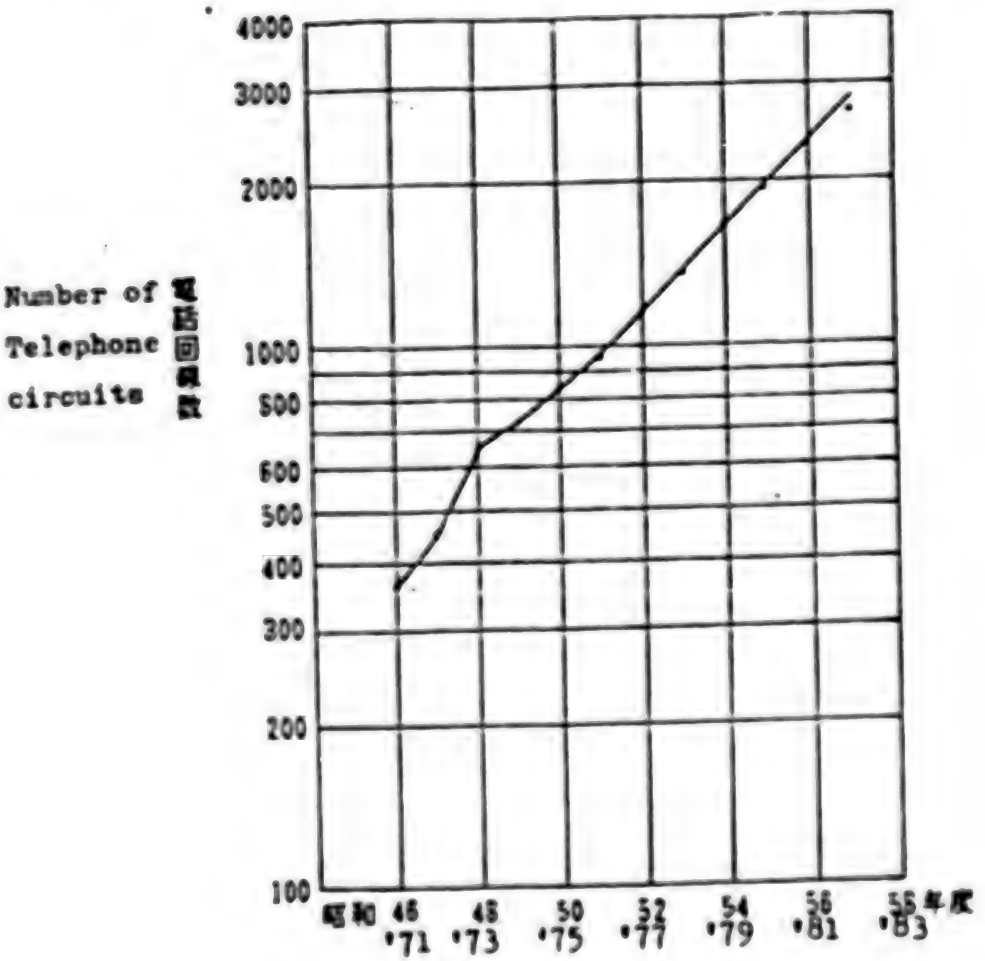


Figure V-2-3 Trend for International Public Telephone Circuits



Increased use is being made of optical-fiber systems in cable-based applications due to their advantages of long relay distances, narrow cores, and costs that are lower than coaxial cable costs.

Also, wireless systems can be installed together with existing analog routes in various frequency bands. Systems are being implemented which can be digitalized, making effective use of existing basic facilities such as station buildings and steel towers. We will probably see more and more of this kind of digitalization in the future.

Research and development is also being done on third-generation milliwave digital relay systems, involving radical revolutions in systems, and on monolithic implementations of 20 GHz systems to achieve ultra-miniaturization. There are strong demands for improving cost-effectiveness and

installability, for aggressively implementing such systems, and for developing new frequency bands such as milliwave bands. This will be important in coping with the demands of increasing communications volumes, providing wireless systems which facilitate easy joint use of frequencies, and contributing to the construction of stable information communications networks in the future.

The use of satellite communications systems is now limited by the small volumes which can be handled. Large-capacity communications satellites will be developed, however, and satellite use will grow, thereby forming the framework of tomorrow's communications networks together with ground-based systems.

In international communications networks, together with the expansion of satellite circuit networks, when optical submarine cables are put in place, routes and systems will be selected with great emphasis on global networks, and not merely on point-to-point transmission routes as with conventional undersea cables. Communications networks will be constructed in which the features of both satellite networks and optical submarine cable networks are fused and used to full advantage.

2.3 Fixed Land Wireless Transmission & Fixed Satellite Communications

(1) Transmission Capacity

Looking at land-based fixed wireless transmission systems, the trunkline microwave systems used in public communications, for example, have a transmission capacity of 3.2 Gb/s (approximately 46,000 telephone ch) using the 4, 5, and 6 GHz frequency bands. This capacity is expected to increase by a factor of 2.2 in the next 10 years due to the implementation of multi-value modulation methods, and by a factor of about 4 over the next 20 years due to wide-span implementations in the 11 and 20 GHz bands (installed jointly with trunkline routes). If single-frequency relays are realized, which send and receive signals at the same frequency, then the capacity of each route will double (Figure V-2-4).

Looking at satellite systems, the CS-2 satellite currently supports a transmission volume of about 4000 telephone channels when the 30/20 GHz and 6/4 GHz bands are combined. With larger satellites and multi-beam implementations, however, this could grow to 100,000 channels over the next 15 years, and could be 120,000 channels in 20 years if the 14/11 GHz band can be utilized (Figure V-2-5).

Comparing transmission volumes in cases where two points are connected with one ground-based route or with one satellite, the ratio between ground and satellite systems is currently about 10:1, but in 20 years this will be more like 1.5:1. Thus by adding the third dimension of satellite radiowave use to the two-dimensional radiowave use of ground systems, it is possible to increase transmission capacities by about 10 percent now,

Table V-2-2 Main Specifications for Various Wireless Systems

Digital Wireless Systems

Item	2 GHz		
	2S-P2	2S-P3	2S-D5
Frequency	2110 - 2290 MHz		
Number of systems	11 in use, 1 reserved	4 in use, set reserved	11 in use, 1 reserved
Transmission capacity	12.6 Mb/s (telephone: 192 CH)	3 Mb/s (telephone: 48 CH)	32 Mb/s (telephone: 480 CH)
Modulation method	4-phase PSK (microwave direct modulation)		16 QAM (IF modulation)
Demodulation method	Simultaneous wave detection Instantaneous detection		
Transmission output	100 mW	130 mW	200 mW
Intermediate receiving frequency	70 MHz	10.7 MHz	70 MHz
Relay interval	25 km		50 km
Applicable distance	200 km	50 km	300 km

[Table V-2-2 continued next page]

[Digital Wireless Systems continued]

Item	5 GHz	11/15 GHz		20 GHz
	5L-D1	11G-D2	15S-P2	20L-P1
Frequency	4400 - 5000 MHz	10.7 - 11.7 MHz	14.40 - 15.23 MHz	17.7 - 21.2 MHz
Number of systems	6 in use, 1 reserv	10 in use, 1 reserv	7 in use, 1 reserv	8 in use, 1 reserv
Transmission capacity	200 Mb/s (telephone: 2880 CH)	100 Mb/s (telephone: 2880 CH)		400 Mb/s (telephone: 5760 CH)
Modulation method	16 QAM (IF modul)	4-phase PSK (microwave direct modulation)		
Demodulation method	Simultaneous wave detection, instantaneous detection	Simultaneous wave detection, instantaneous detection		Simultaneous wave detection instantaneous detection
Transmission output	400 mW	1 W	200 mW	150 mW
Intermediate receiving frequency	140 MHz	140 MHz		1.7 GHz
Relay interval	50 km	20 km	8 km	3 km
Applicable distance	2500 km		300 km	2500 km

[Table V-2-2 continued next page]

Analog Wireless Systems

Item	2 GHz	4 GHz		5 GHz
	UF-B5	SF-B7	SF-B8	SF-E2
Frequency	2110 - 2290 MHz	3600 - 4200 MHz	3600 - 4200 MHz	4400 - 5000 MHz
Number of systems	5 in use, 1 reserv	6 in use, 1 reserv	6 in use, 1 reserv	6 in use, 1 reserv
Transmission capacity	960 CH	1800 CH or 1 color television CH	3600 CH	3600 CH
Modulation method	FM	FM	FM	FM
Relay method	Heterodyne relay	Heterodyne relay	Heterodyne relay	Heterodyne relay
Transmission output	1.6 W	5 W	31.5 W	28 W
Intermed frequency	70 MHz	70 MHz	140 MHz	140 MHz
Relay interval	50 km	50 km	50 km	50 km
Applicable distance	300 km	2500 km		

[Table V-2-2 continued next page]

Analog Wireless Systems

Item	6 GHz	11 GHz		15 GHz
	SF-U4	SF-T2-3	SF-T7	SF-F5
Frequency	5925 - 6425 MHz	10.7 - 11.7 MHz		14.40 - 15.23 MHz
Number of systems	7 in use, 1 resrv	11 in use, 1 resrv	10 in use, 1 rsrv	7 in use, 1 reserv
Transmission capacity	2700 CH	1200 CH	3600 CH	3600 CH
Modulation method	FM	FM	FM	FM
Relay method	Heterodyne relay	Wave-detect relay	Heterodyne relay	Heterodyne relay
Transmission output	16 W	630 mW	7 W	2 W
Intermed frequency	140 MHz	--	140 MHz	140 MHz
Relay interval	50 km	30 km	20 km	8 km
Applicable distance	2500 km	300 km	2500 km	

Table V-2-3 Main Specifications for Various Cable Systems

Coaxial-Cable Systems

Item	C-4M	C-12M	CP-12MTr	C-60M	DC-100M	DC-400M	CS-12M	CS-36M-DR
Number of channels	960	2700		10,800	1440	5760	1600	2700
Transmission frequency	60-4028 KHz	300 - 12,388 KHz		4287 - 61,160 KHz	100 Mb/s	400 Mb/s	0.3 - 12 MHz	4 - 36 MHz
Cable	Standard		Joint		Standard		Coaxial	
Applicable distance	2500 km				300 km	2500 km	6700 km	1500 km
Noise standard	5 pW/km		1.5(3.0)	≤3 pW/km	10^{-9}/300 km	10^{-9}/ 2500 km	1 pW/km	
Relay interval	9 km	4.5 km	4.5(2.0)	1.5 km	3.5 km	1.5 km	12 km	5.8 km

[Table V-2-3 continued next page]

Optical-Fiber Cable Transmission Systems

Item	F-6M	F-32M	F-100M	F-400M	OS-280M
Code transmit speed	6.312 Mb/s	32.064 Mb/s	97.728 Mb/s	397.200 Mb/s	280 Mb/s
Number of channels	96	480	1440	5760	4000
Optical fiber	G.1			SM	
Wavelength used	1.3 micrometer				
Light emitters	In GaAs P-LD				
Light receptors	Ga-APD				Ge-APD
Relay interval	15 km	10, 15, 25 km		20, 25 km	50 km

Table V-2-4 Main Specifications for Domestic Satellite Communications Systems

Earth-Station Types		Fixed Stations		
		Sub-Milliwave Fixed Stations		Microwave Fixed Stations
Communications system		Digital	Analog	Digital
Frequency band used	Up link	30 GHz	30 GHz	6 GHz
	Down link	20 GHz	20 GHz	4 GHz
Transmission capacity (per relay) (Number of bidirectional channels for telephones; number of unidirectional channels for color TV)		Telephone: 480 CH Color TV: 1 Ch Telephone: 1920 CH 4 relays		Telephone: 192CH & Color TV: 2 CH (See note) Telephone: 432 CH & Color TV: 1 CH 672 CH

Note: Convertible at ratio of 240 telephone CH (bidirectional) per 1 color TV CH (unidirectional).

[Table V-2-4 continued next page]

Earth-Station Types		Mobile Stations			
		Sub-Milliwave Fixed Stations		Microwave Fixed Stations	
Communications system		Analog		Analog	
Frequency band used	Up link	30 GHz		6 GHz	
	Down link	20 GHz		4 GHz	
Transmission capacity (per relay) (Number of bidirectional channels for telephones; number of unidirectional channels for color TV)		Telephone 132 CH or color TV 1 CH	Telephone 60 CH	Telephone 132 CH or color TV 1 CH	Telephone 60 CH

Table V-2-5 Main Specifications for Intelsat Satellites

Item		System IV-A Satellites	System V Satellites
Communications system		FDM/FM/FDMA PCM/PSK/SCPC PSK/SCPC FM/TV	FDM/FM/FDMA PCM/PSK/SCPC PSK/SCPC SPADE CFDM/FM (PSK/TDMA)*
Frequency Band Used	Up link	6 GHz (500 MHz wide)	6 GHz, 14 GHz (each 500 MHz wide)
	Down link	4 GHz (500 MHz wide)	4 GHz, 11 GHz (each 500 MHz wide)
Number of transponders		20	27
Transmission capacity		6000 telephone circuits + 2 TV channels	12,000 telephone circuits + 2 TV channels

* Use started in fiscal 1984

Table V-2-6 Main Specifications for Inmarsat Satellites

Item		Marisat Satellites	Marex Satellites	MCS Carried on Intelsat Mark V
Communications system		CFM/SCPC TDM/PSK/FDMA PSK/TDMA	Same as at left	Same as at left
Frequency band used	Satell - ship	1.6 GHz, 1.5 GHz (each 4 MHz wide)	1.6 GHz (5.5 MHz wide); 1.5 GHz (5.5 MHz wide)	1.6 GHz, 1.5 GHz (each 7.5 MHz wide)
	Satell - grnd	6 GHz, 1.5 GHz (each 4 MHz wide)	6 GHz (5 MHz wide); 4 GHz (5.5 MHz wide)	6 GHz, 4 GHz (each 7.5 MHz wide)
Numb transponders		2	2	2
Transmission capacity (converted to voice class)		8 circuits	46 circuits	30 circuits

and by about 67 percent 20 years from now, thereby making it possible to effectively utilize frequency.

In the case of ground-based systems, the transmission capacities noted above can be realized between any two locations, each as separate routes, and multiple routes can be laid between the same two points so long as it is within the allowable values of interferrence. For example, in the public communications networks, there are about 80 group centers throughout the entire country, and about 130 paths which connect these with nearby group centers as existing transmission routes. Accordingly, the volume which can be provided to all of Japan is 130 times the capacity per single route using only existing transmission routes, and if newly constructed routes are considered, about twice this amount (approximately 260 times the route capacity) can be achieved.

With satellite systems, on the other hand, this capacity can be increased by using multiple satellites simultaneously. If, for example, five satellites can be used 20 years from now, then the capacity which can be provided for all of Japan will be five times the capacity per satellite.

In other words, making comparisons of the total transmission capacities which can be provided for all of Japan, the land systems which can repetitiously use more frequencies are advantageous, and, looking at the circuits which run between adjacent group centers in 1-channel units, the ratio is about 100 times.

With satellite systems, however, since direct transmission routes can be laid between distantly separated stations, the aforesaid ratio will shrink when it is considered that one section in a satellite system corresponds on average to 3 - 5 sections in a land-based system, and the total transmission capacity of land-based systems may be regarded as 20 - 30 times that of satellite systems.

Thus it is possible to greatly increase the transmission capacities of both fixed land-based wireless systems and fixed satellite systems in the future, and these can adequately cope with demands for wide-band communications on a par with optical-fiber systems.

(2) Economy

The cost of satellite systems is not dependent on communication distances, so when these costs are compared to those for land-based systems, it is generally argued that land systems are more economical for short distances, while satellite systems become increasingly cost-effective as the distances increase.

It is not realistic to compare these two systems by using simple models of satellite systems having inherent network characteristics and of land systems having inherent point-to-point communications characteristics, but

such comparisons must be made using models which correspond to utilization modes.

With satellite systems having network characteristics, the most important point in terms of economic comparison is that a system's total capacity can be used by dividing the service area into any desired sections, either spatially or chronologically. In other words, with satellite systems, as will also be discussed in (5), it is possible to efficiently cover circuit demands which are widely scattered over large areas and which differ in capacity. Meanwhile, with land-based systems, there are no point-to-point transmission routes having the same capacity, and it is customary to set up an overlapping hierarchy corresponding to transmission capacity and distance, successively gathering small bundles of circuits into larger and larger circuit bundles. For this reason, with land-based systems, depending on the lower coverage ratio, there are cases where the cost-effectiveness of large-bundled systems is not adequately realized.

Comparing circuit costs between two points for satellite-based and land-based networks, respectively, the general situation is as graphed in Figure V-2-6, and it is seen that the point of economic equilibrium between the two types of system varies greatly with the coverage ratio. For example, when a 100,000-channel large-capacity satellite of 1995 - 2005 vintage is compared to a land-based system having about 30,000 channels in the area where its route capacity is greatest (land-based microwave or optical-fiber system), when the coverage is large this becomes roughly 1000 - 2000 km, but declines to a fraction of this when the coverage becomes small. Moreover, with satellite systems, it is possible to change section capacities and establish circuits flexibly according to chronological fluctuations in circuit demand, so it should be possible to make networks more economical overall by using satellite systems in conjunction with land-based systems (with which such changes are difficult), thereby covering the fluctuations.

(3) Reliability

With respect to durability in the face of disaster, when cable systems are compared with land-based wireless systems, as was noted in 2.4, the damage ratio for land-based wireless systems is calculated to be about 100 times smaller.

When circuits are formed with satellite systems, the reliability becomes even greater than with land-based wireless systems. With satellite systems, the number of ground installations becomes small (requiring, in the case of establishing an earth station at each group center, about 1/4 of the stations needed for land-based microwave systems that interconnect group centers), and, since these installations are in suburban areas, the time required to restore service after damage is shortened. It is therefore thought that the aforesaid damage rate can be improved by another factor of 10 or so, as compared to land-based wireless systems.

(4) Transmission Quality

In satellite communications, the problem of quality deterioration arises due to delays and associated echoes. Improvements are made in this regard using echo suppressors or echo cancelers, and the results of quality evaluation tests done to date in Japan using these devices are graphed in Figure V-2-7. Comparisons are made with the delay-0ms [sic] ground standard coefficient (ordinarily [illegible] delay exists), and the evaluation values for satellite systems (MOS value = mean opinion scores) [illegible] low values. When echo suppressors are used, in particular, there are cases where the value of MOS = 1.5 (the level at which about 50 percent of people will say "pretty good")--the standard for the present telephone system, on the side of small circuit loss--is not reached. In cases where echo cancelers are used, the MOS value is around 2.0 (the level at which about 78 percent of people will say "pretty good"), presenting no great problems in actual practice.

In data communications, there are cases where satellite circuits cause deterioration in data transmission efficiency and protocol problems in terminal connections. In order to solve these problems, data is temporarily accumulated in time buffers, transmitted continuously in units of several frames to improve transmission efficiency, protocol modifications are conducted, and development work is being done on satellite delay compensation units (SDCU's), so that, in practice, the problems are becoming fewer. Except for this delay/echo phenomenon, there is almost no difference in transmission quality between satellite systems and land-based systems.

(5) Inherent Characteristics of Satellite Communications

In the foregoing we have compared the attributes and performance features which are common to the various transmission modes. Satellite communications, however, offer the following superior features which are not provided by land-based systems.

a. Wide geographical range
b. Multi-dimensional connectability
c. Flexibility of network structure
d. Adaptability and portability
e. Multiple-addressability

Although these features are expressed differently, they all arise from the wide geographical range of satellite communications, wherein, so long as it is within the visual range of the satellite (which is the relay point)--i.e. within the satellite's service area, communications are possible from anywhere.

With land-based systems, regardless of whether cable or wireless, relay points are one-dimensionally linked together, as shown in Figure V-2-8, to

form a two-dimensional expansion, and thereby form a network, whereas with satellite systems, many earth stations which are spread out two-dimensionally can access one satellite in a third dimension, immediately effecting a more complete network.

There are two types of multi-dimensional connections, namely frequency-division multiplexing (FDMA) and time-division multiplexing (TDMA). With the advances in digital technology in recent years, more and more use is being made of time-division multiplexing, which allows for free alteration of transmission capacities between ground stations.

When TDMA is used, it is easy for satellite circuits to provide variable capacity circuits. In land-based transmission routes, on the other hand, with the conventional FDM system, it is necessary to provide each route with a number of circuits which matches the peak traffic, and even if traffic concentrations are staggered chronologically by route, it is physically impossible to merge surplus circuits. Accordingly, in terms of total routes, this requires a great many surplus facilities. With conventional TDMA systems, it becomes easy to alter ground-allotment times to accord with fluctuations in traffic with the ground, and there is reduced necessity to provide many surplus circuits. With satellite circuits using TDMA, however, it is possible to divide and apportion satellite transmission capacities to the necessary earth station links (routes) according to need, so that one only need maintain the maximum number of circuits needed by the entire network when viewed in a specific time span, resulting in high circuit utilization efficiency. Another important feature of satellite-based TDMA is the ability to obtain high circuit coverage ratios. Since TDMA constitutes a complete network, the 384 kb/s or 1.544 Mb/s signals which interface with the ground networks are converted to the beat-rate signals of the TDMA highways at the transmitting earth station at one time, and returned to the original signal speed at the receiving earth station.

In land-based systems, high-level groups are gradually built up at the signal relay point, following the digital signal hierarchy. When conducting this buildup, the actual number of circuits ordinarily does not match the circuit bundles in the hierarchy, so this is accommodated by a certain ratio k. For this reason, as buildup is gradually conducted toward high-level groups, the coverage (or accommodation) ratio of the highway which is the high-level group becomes smaller by the power k. Accordingly, after four or five hierarchy conversions, the coverage ratio for land-based systems becomes rather low as compared to satellite systems using non-hierarchy-converting TDMA.

This difference in circuit utilization efficiency is a factor which should be considered when comparing the cost-effectiveness of satellite systems and land-based systems, as noted in (2) above. The adaptability and portability of satellite systems also derive from their wide geographical range, so that geographical obstructions can be surmounted, and, if

necessary, mobile units and other portable stations can be used, making it possible to set up temporary communications lines anywhere. The same is true of multi-addressability. The greatest feature of satellite communications is its point-to-multiple-point communications mode, as is clearly evidenced in the rapid growth of newspaper transmission and cable TV distribution networks that use satellites in the United States.

(6) Conditions for Growth of Fixed Satellite Communications

In order for fixed satellite communications to develop so as to fully realize the advantages (wide range, multi-dimensional connection, etc.) discussed above and contribute significantly to the effective three-dimensional utilization of radiowaves and the stabilization and enhancement of communications networks, it is believed that the following conditions must be satisfied.

A. Implementation of Larger Satellites

In order for fixed satellite communications systems to realize the transmission-capacity economies discussed in (1) and (2), it will be necessary to repetitiously use frequencies by means of multi-beam implementation, but, as shown in Figure V-2-9, satellites need to be made larger in order that the number of multiple beams can be increased.

When using a fixed satellite communications system to realize a required transmission capacity, the single-satellite system is generally more economical than the multiple-satellite system. The relationship between relative per-telephone-channel costs and per-satellite weights is indicated in Figure V-2-1.

B. Joint Use of Frequencies With Fixed Land-Based Wireless Systems

Japan's communications networks are characterized by the high-density implementation of fixed land-based wireless systems using radiowaves from microwaves to submilliwaves. In order for fixed satellite systems to be successfully merged with these existing networks, it is necessary to effect the joint use of frequencies between ground stations and satellites under conditions which are reasonable. The following three factors should be considered in implementing the joint use of frequencies.

(a) Frequency bands used
(b) Installation density of earth stations and ground stations
(d) Interference reduction measures (shielding, interference compensation, etc.)

With respect to (a), the frequency bands used, the antenna beam tends to become sharper as the frequency becomes higher, thereby making frequency joint use easier.

With respect to (b), i.e. geographic characteristics, many ground stations already exist close to large metropolitan areas, and routes are congested, so that the areas where earth stations for use with fixed satellite systems can be established are extremely limited, but these conditions are not nearly as severe in smaller cities.

With respect to (c), measures which can be taken to reduce interference, a number of methods can be used, such as placing shields around earth-station antennas, or using interference-compensating technology to actively receive interference waves coming from certain directions and employ these to eliminate the interference signals that are mixed in with the desired signal.

The relationships between factors (a) - (c) and the realization of frequency joint-use are conceptually illustrated in Figure V-2-11.

2.4 Fixed Land-Based Wireless Transmission and Optical-Fiber Transmission

(1) Transmission Capacity

With respect to fixed land-based wireless transmission, as discussed in sections 2 and 3, it is possible to increase the per-route transmission capacities of long-distance microwave facilities now used on trunklines, as shown in Figure V-2-4. Also, the transmission capacity (planar capacity) between any two points depends on the allowable branching angle for the type of system, and future developments in interference-compensation technology and antenna technology will make it possible to increase the number of routes which can be laid, so that planar capacities can be achieved which are several times greater than the aforesaid route capacities.

Meanwhile, with respect to optical-fiber transmission, with the present state of geographic expansion, it is possible to transmit 5760 telephone-convertible channels per system. When 24-core optical fiber is used, the per-conduit transmission capacity becomes roughly 69,000 channels. If the 1.6-Gb/s transmission system now being researched can be implemented, the per-conduit capacity will increase to 280,000 channels. If 48-core optical fiber is used, it will be possible to achieve a transmission capacity of something like 550,000 channels. It is conceivable that these capacities will become even larger through achievements in wavelength-division multiplexing methods and coherent light transmission methods.

(2) Economy

With respect to long-distance transmission systems used as trunkline transmission routes, when comparisons are made between fixed land-based wireless transmission systems and optical-fiber transmission systems, the wireless systems are somewhat advantageous at the present time because optical-fiber itself is still expensive. With optical-fiber transmission

Figure V-2-4 Projected Trends in Transmission Capacity for Land-Based Wireless Systems (Trunkline Microwave Routes)

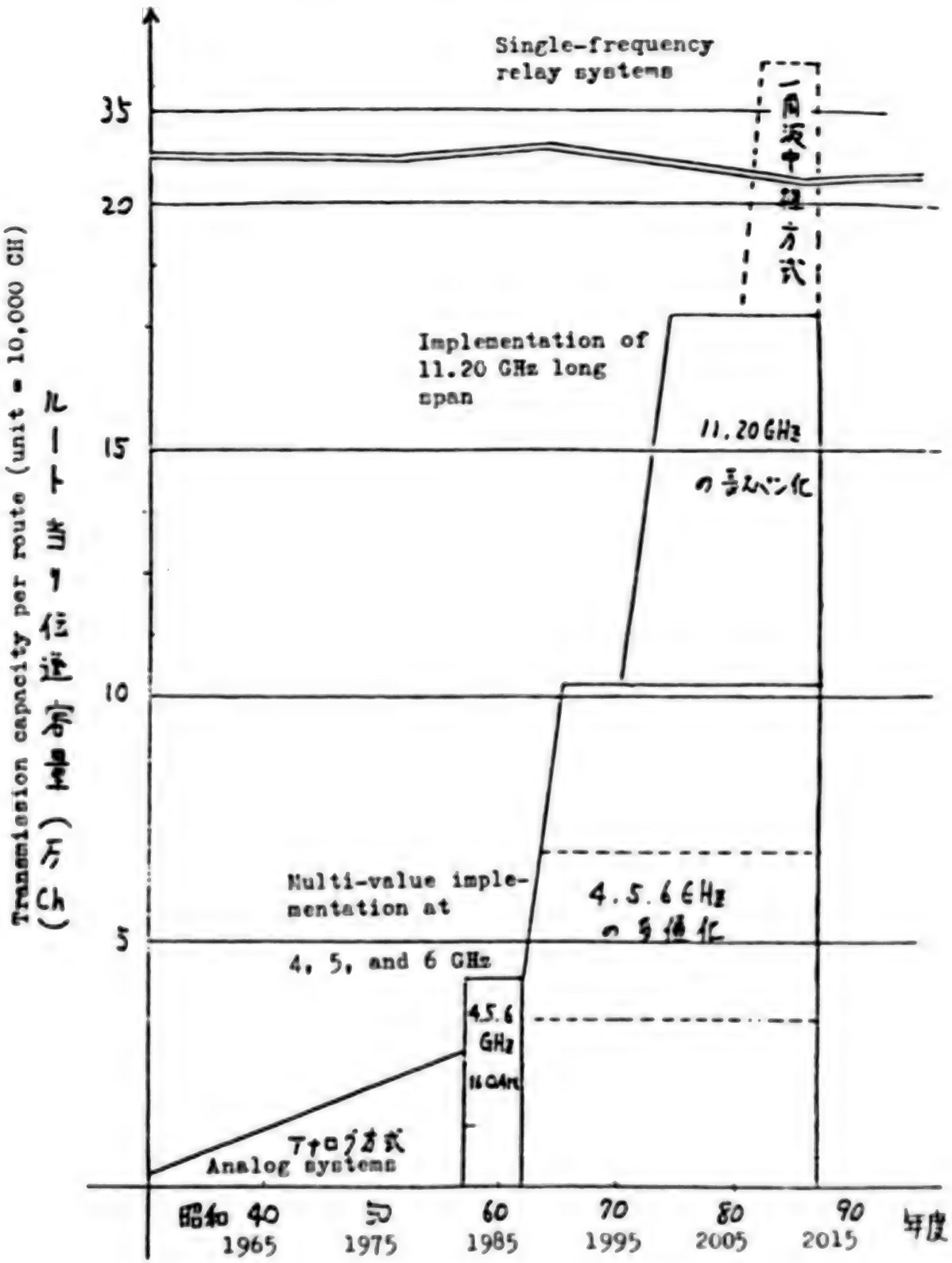
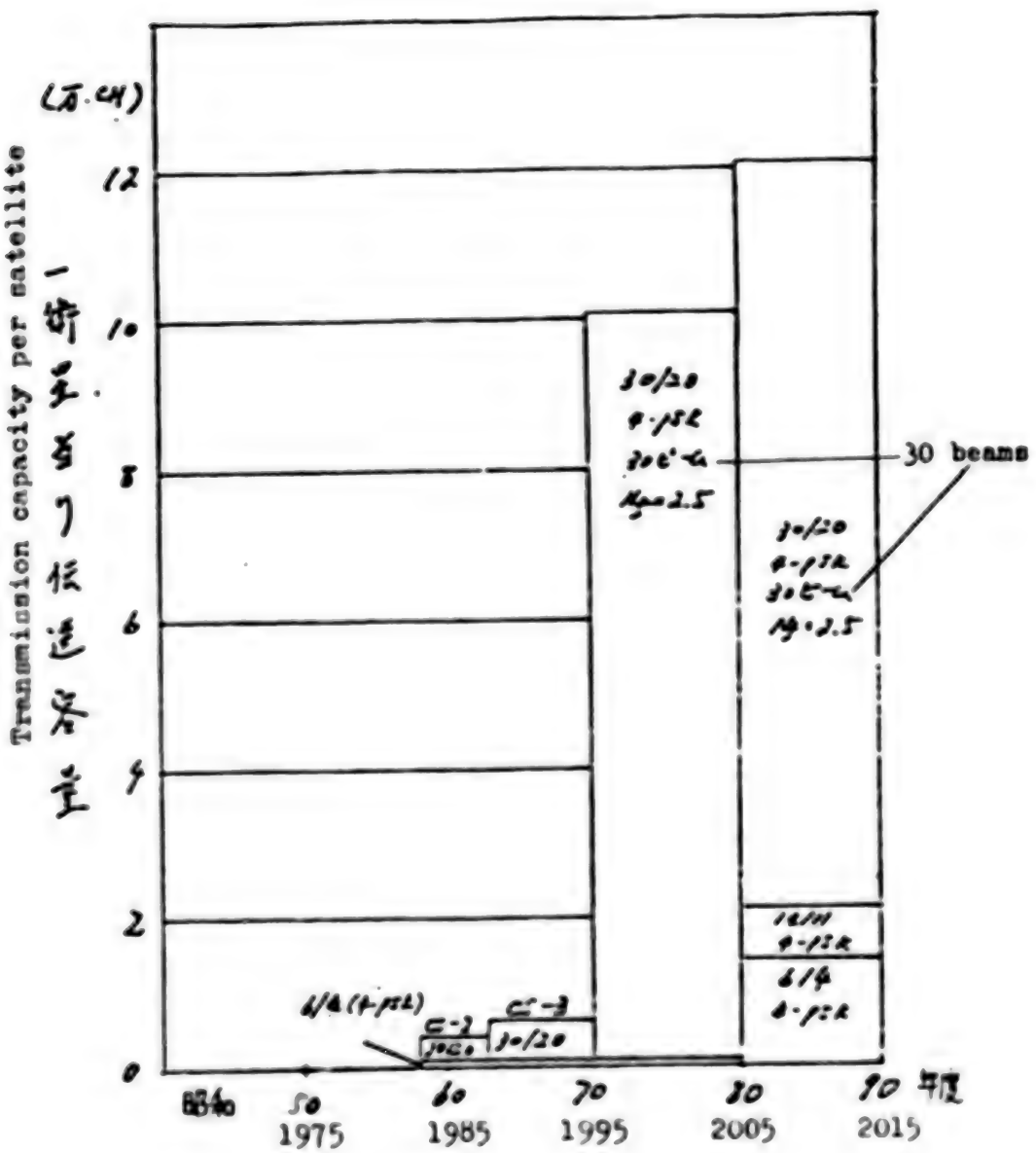
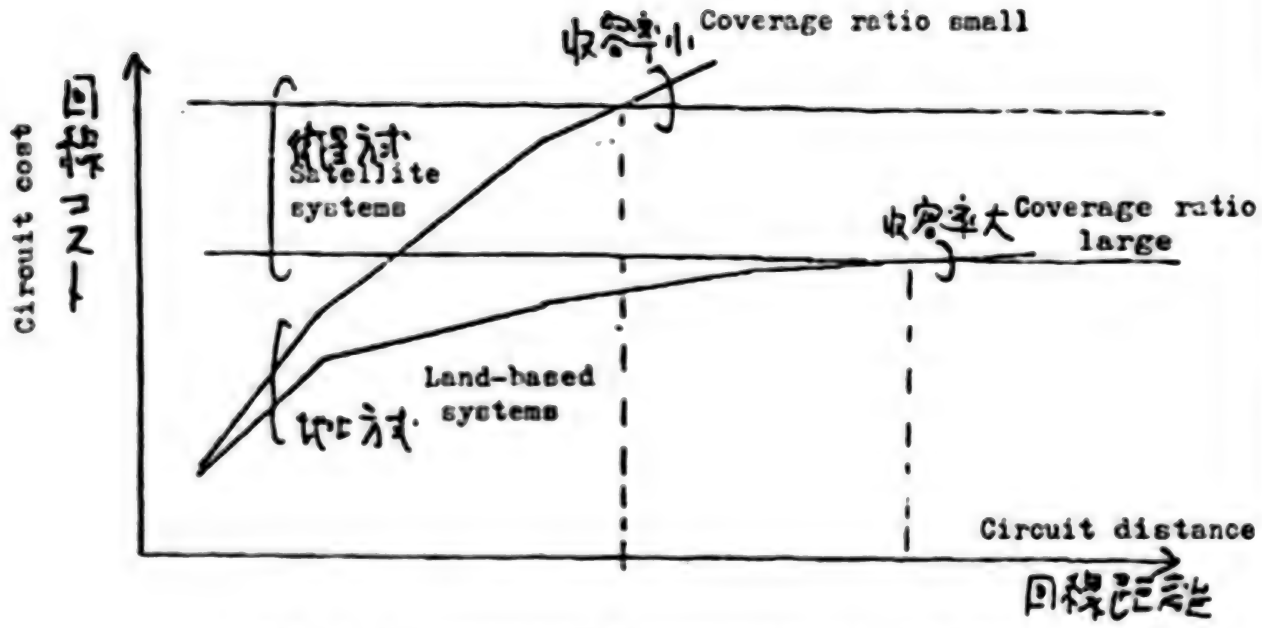


Figure V-2-5 Projected Trends in Transmission Capacity for Satellite Communications Systems



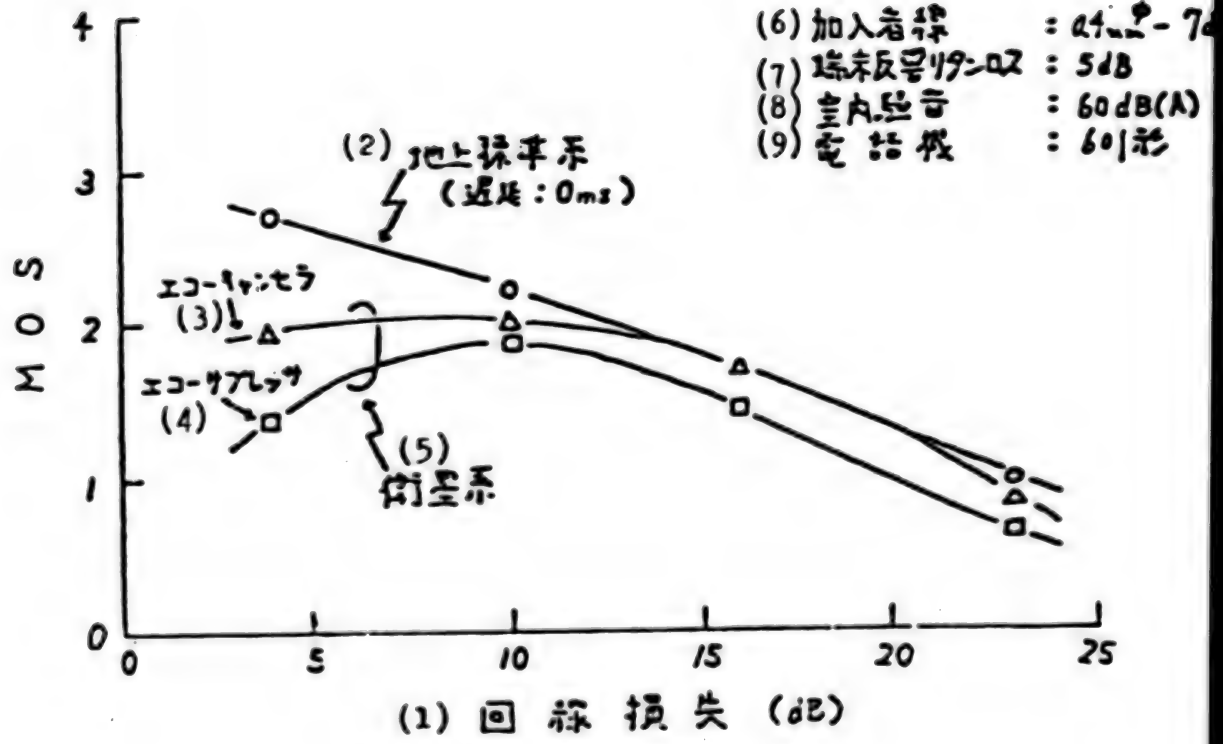
図Ⅰ－2－5 衛星通信方式の伝送容量予測推移

Figure V-2-6 Conceptual Cost Comparison Between Fixed Satellite Communications and Fixed Land-Based Wireless Transmission



図V－2－6 固定衛星通信と地上固定無線伝送のコスト比較概念図

Figure V-2-7 Example of Voice Communications Quality Evaluation



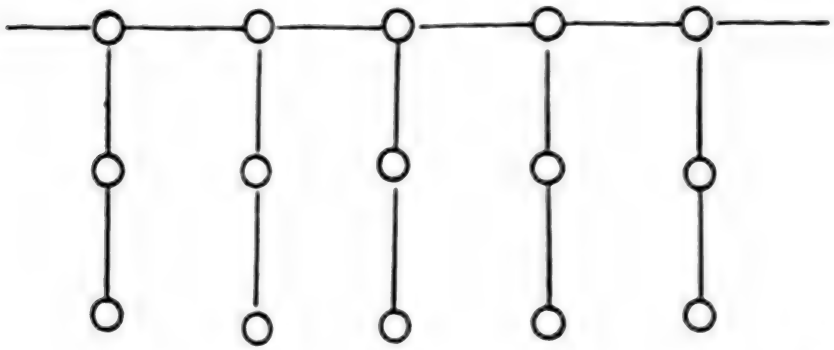
図Ⅴ－2－7 通話品質評価の一例

（出典：CS-81-140通信方式研究会 1981. 12. 22）

Key to Figure V-2-7:

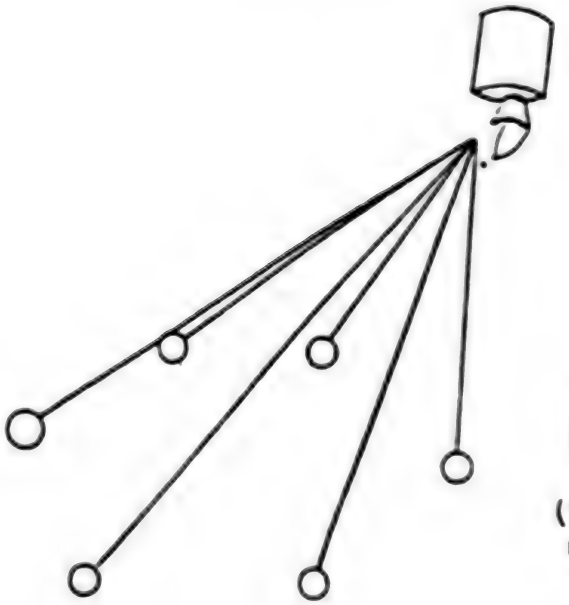
1. Circuit loss (dB)
2. Standard land-based system (delay = 0 ms)
3. Echo canceler
4. Echo suppressor
5. Satellite system
6. Subscriber line: 0.4 mm φ - 7 dB
7. Terminal echo return loss: 5 dB
8. Indoor noise: 60 dB (A)
9. Telephone instrument: 60 f type

Figure V-2-8 Structural Comparison Between Land-Based and Satellite Systems (Showing Physical Connection Rela ionships)



(a) 地上方式
(a) Land-based system

(カスケード接続またはループ接続による不完全メッシュ網)
(Imperfect mesh network using cascade or loop connection)



(b) 衛星方式
(b) Satellite system

(多元接続による完全メッシュ網)
(Perfect mesh network using multi-dimensional connections)

図V-2-8 地上方式と衛星方式の網構成上の比較
(物理的な接続関係を示す)

Figure V-2-9 Satellite Weight and Per-Channel Implementation Cost

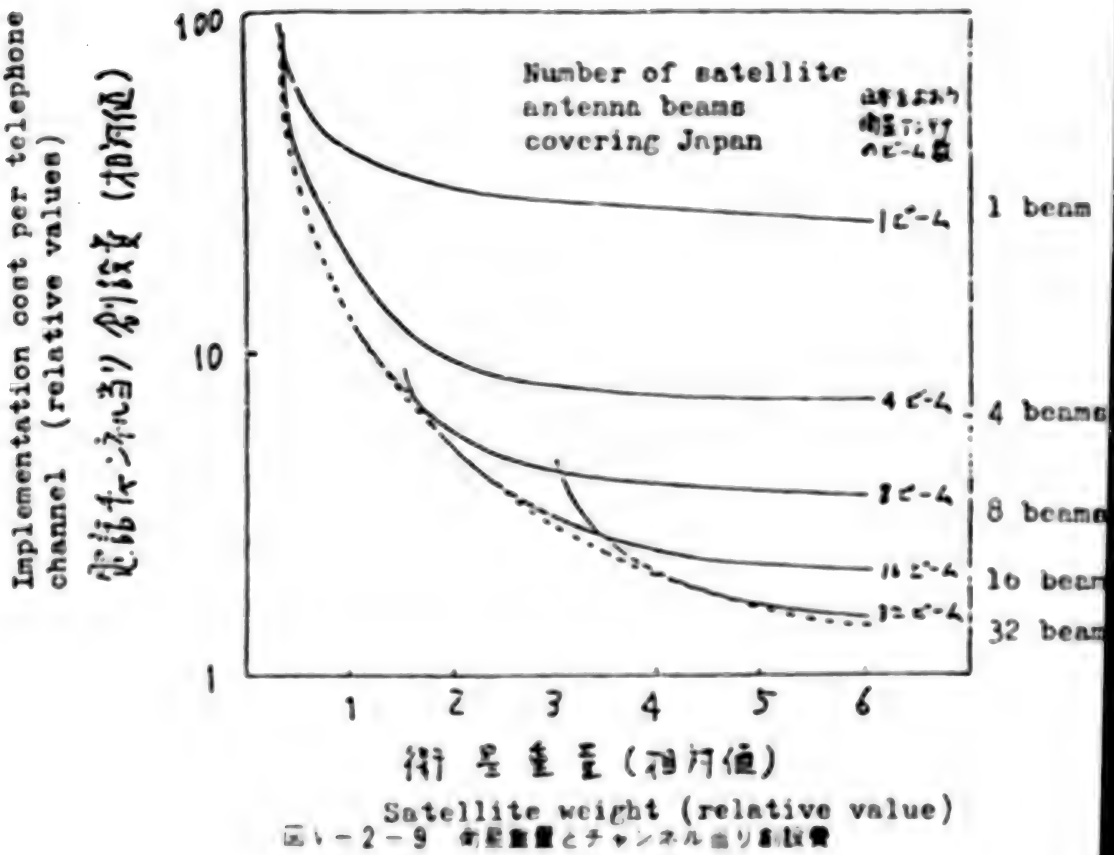
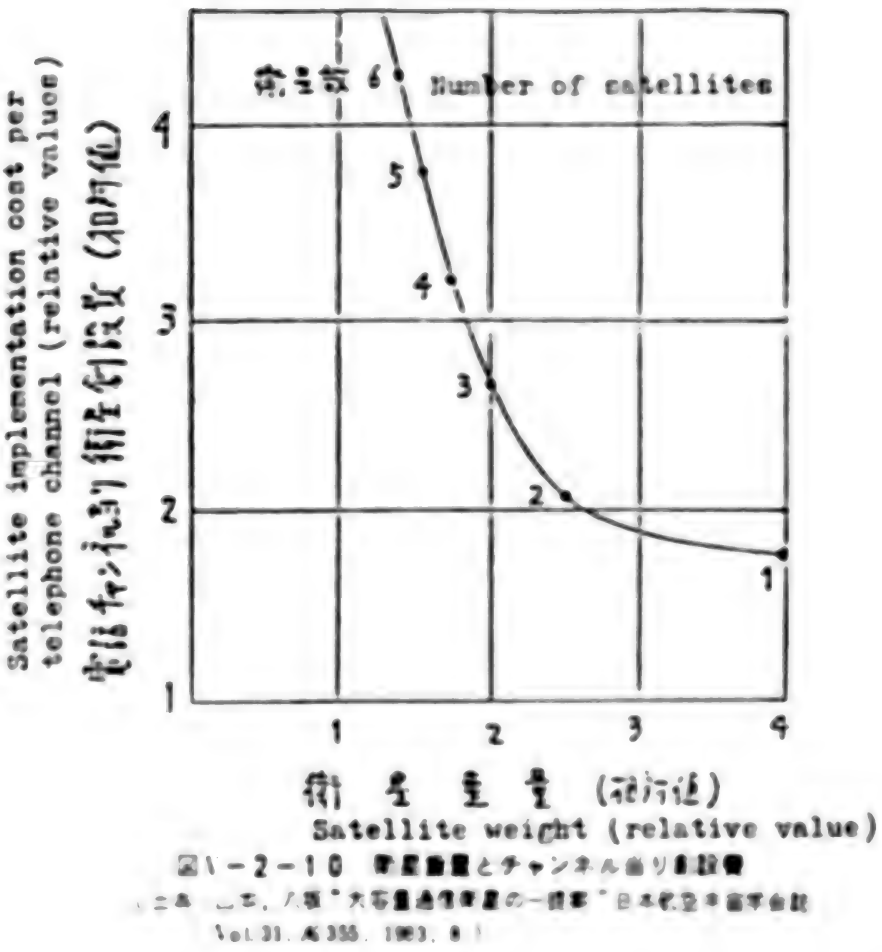


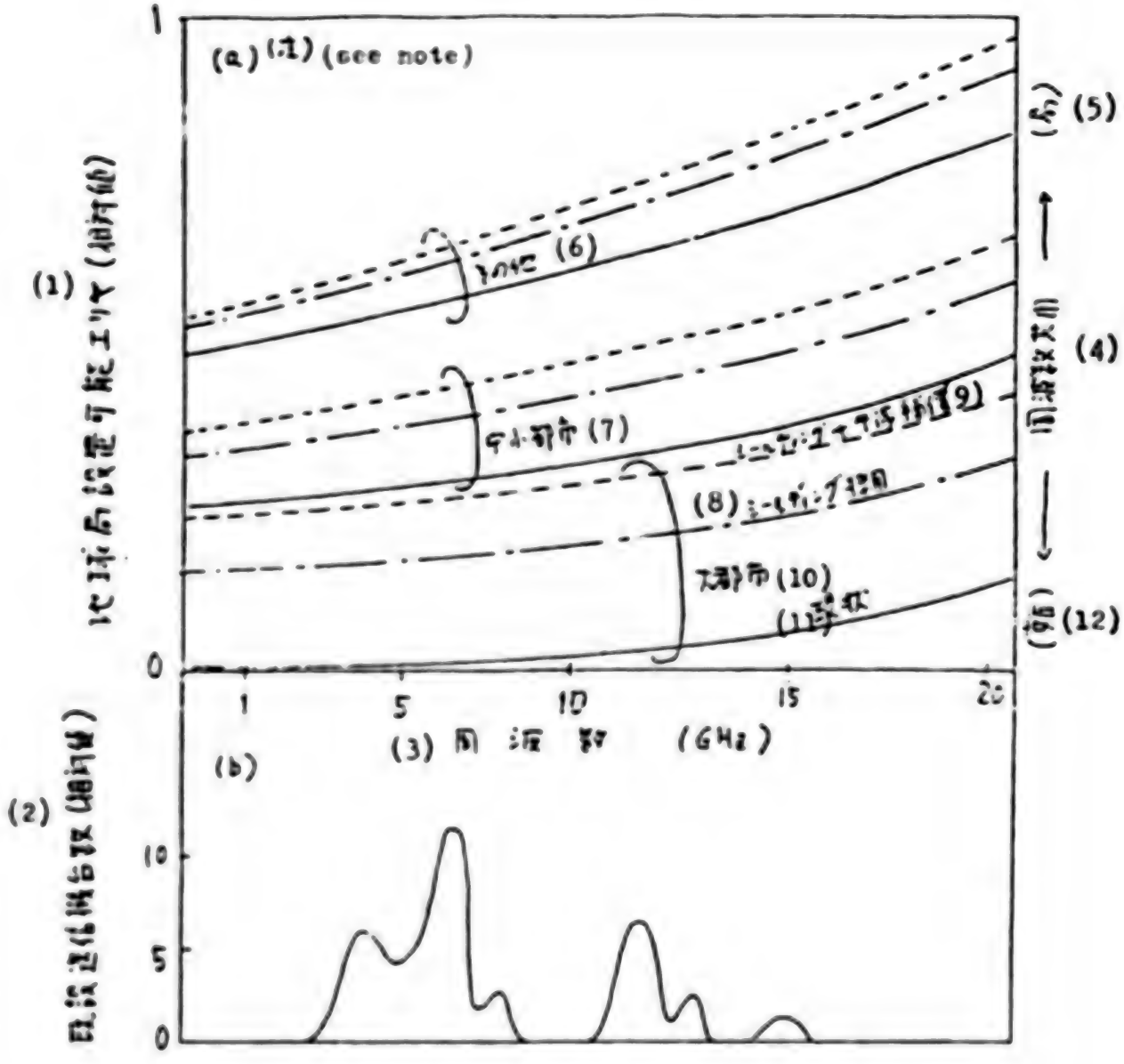
Figure V-2-10 Satellite Weight and Per-Channel Implementation Cost



図Ⅴ-2-10 [illegible]
[illegible]
Vol 31, No 355, 1983, 8)

(Source: Yamamoto & Yasaka, "Dai-Yoryo Tsushin-Eisei no Ichi Teian," Nihon Koku Uchu Gakkai-Shi, Vol 31, No 355, August, 1983)

Figure V-2-11 Feasibility of Joint Frequency Use Between Land-Based System and Fixed Satellite System



(13) (注) (a)図は一般的な概念を示しており、実際には(b)図に示す既存設備により、共用の難易度に著しい差異が生ずる必要がある。またビル影、山影などしゃへい物のある地点においては、相対的に容易になるが、このようなミクロ的効果は含まず。

図V-2-11 地上系と、固定衛星方式間の周波数共用可能性

Key to Figure V-2-11:

1. Areas where earth stations can be installed (relative values)
2. Number of transmitters already installed (relative values)
3. Frequency (GHz)
4. Frequency joint use
5. Station
6. Other
7. Small-medium cities
8. Shielding employed
9. Shielding + interference compensation
10. Large cities
11. Current situation
12. [illegible]
13. Note: The general concept is illustrated in (a). In actual practice, the relative ease of joint use must be weighted according to the existing facilities as indicated in (b). Also, joint use is relatively easy in localities where there are obstructions such as building or mountain shadows, but such micro-effects are not included here.

systems, the cost of the fiber and cable-laying costs make up a large part of the cost of transmission routes. Since expenses become higher for low-capacity circuits, it is the large-capacity transmission routes that are cost-effective, and this trend is also applicable to short-distance transmission systems. It is possible that, in the future, declines in the price of optical fiber and larger-capacity implementations will make optical-fiber transmission just as economical as, or even more economical than, fixed land-based wireless transmission. However, when all the conditional factors are taken into consideration, it is not unlikely that constructing underground facilities to accomodate optical fiber will become even more difficult than it has been, which means that an important point in selecting transmission modes will be whether or not existing conduits can be utilized.

Almost all conventional public communications cables are laid under public roads, and, since both of these are national public properties, no fees have been required for installation. In the future, as the form of communications operations changes and becomes more diversified, it may not be possible to maintain this advantage. This could have considerable impact on the economics involved.

(3) Reliability

When wireless systems and cable systems are compared using data accumulated in the past, wireless systems are 100 to 1000 times superior to cable systems in terms of system operation ratios. This is due to the fact that cable transmission systems involve much greater down time due to

line obstructions, as is also evident in the damage which results from calamities.

For example, cable transmission systems begin to have problems when earthquakes of magnitude 5 occur, whereas wireless systems begin to have problems at magnitude 6. In terms of average restoration times also, the cable transmission systems require several tens of hours, whereas wireless transmission systems require several hours. In the transmission route model diagrammed in Figure V-2-12, traffic-loss comparisons were made conducting earthquake simulations in tandem. The results for the wireless systems were roughly 1/30 those for the cable systems. We can thus say that land-based wireless transmission systems are highly reliable.

(4) Conclusion

As discussed in sections 2 and 3 of chapter V, the intertoll trunklines having some 1.3 million channels at the end of fiscal 1982 reflect the growth in the demand for wide-band terminals. In the future, however, as the demand for non-telephone terminals grows, this is expected to increase by a large amount. For this reason, technological research is absolutely essential for implementing larger-capacity transmission routes.

The role of telecommunications in both society and private life will also become increasingly important, and the implementation of more highly reliable telecommunications networks is critical to the infrastructure needed to support modern society.

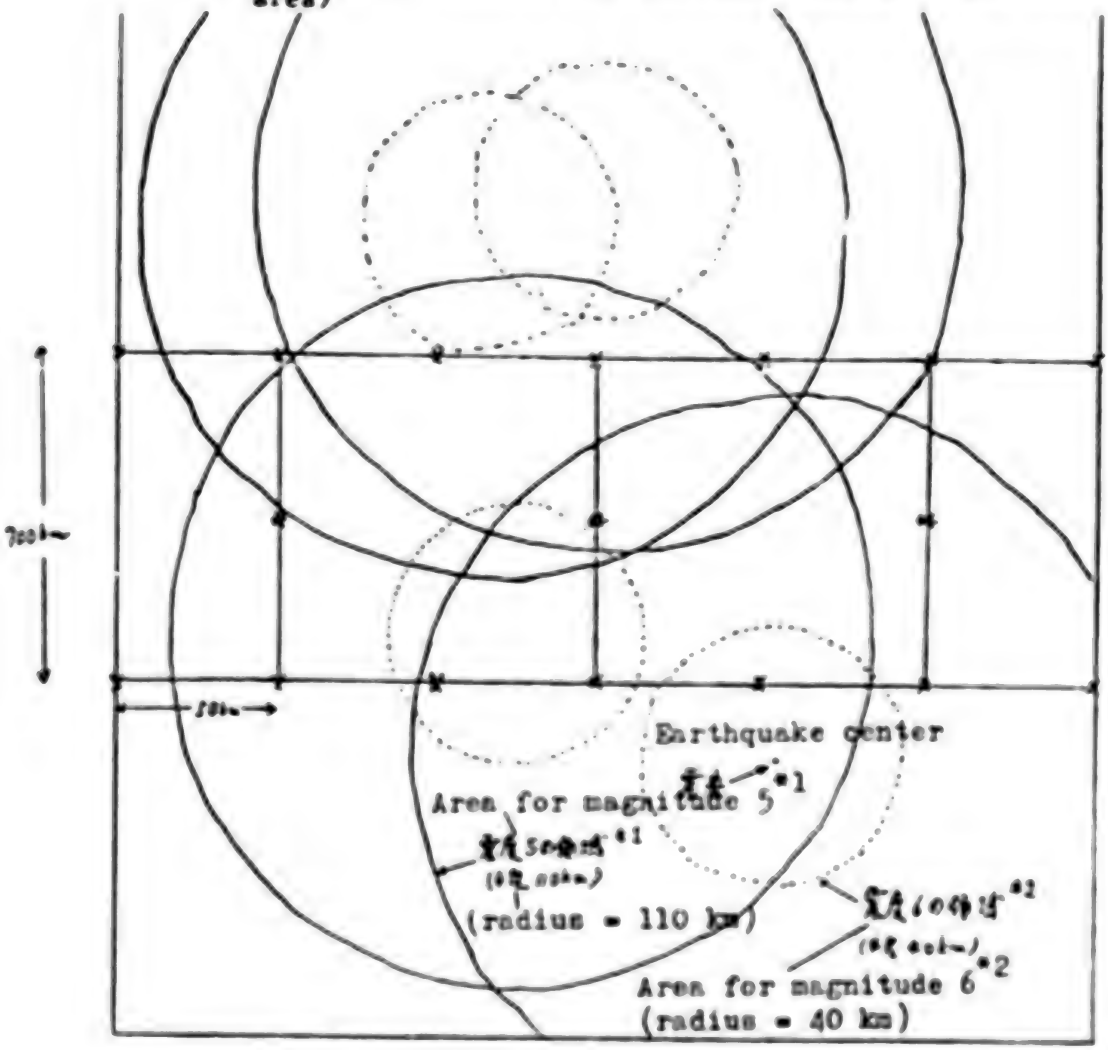
In order to respond to the needs of society discussed above, we must carry on research and development in the effective utilization of radiowaves through increased transmission capacities, interference compensation, and variable-time-division technology, and achieve more highly reliable transmission routes by using fixed land-based wireless transmission systems and optical-fiber transmission systems to complement each other.

2.5 Fixed Satellite Communications & Optical-Fiber Transmission

(1) Transmission Capacity

With respect to fixed satellite communications systems, as was discussed in sections 2 and 3, the system which is presently commercialized for Japanese domestic communications is the CS-2. This system has a transmission capacity of some 4000 telephone channels per satellite when the 30/20 GHz and 6/5 GHz bands are combined, but this should become more like 100,000 channels per satellite within 15 years through larger satellite implementation and multi-beam technology. Within 20 years it is thought that 120,000 channels per satellite can be achieved. These capacities assume the presently used modulation method (4PSK), but it is possible that even greater gains in capacities will be attained in the future by further developments in multi-value technology. If the simultaneous use

Figure V-2-12 Earthquake-Caused Circuit-Damage Radiuses (assuming cables laid and wireless relay stations located within earthquake area)



図V－2－12 地震時の回線障害想定
（地震想定域内のケーブル区間及び無線中継所で回線断と想定）

(1) ● 無線中継所
(2) —— ケーブルルート
(3) *1 ケーブル伝送が障害すると想定した領域
(4) *2 地上無線伝送が障害すると想定した領域

Key:

1. ● Wireless relay station
2. —— Cable route
3. *1 Area where damage is assumed to cable transmission
4. *2 Area where damage is assumed to land-based wireless transmission

of multiple satellites is considered, it may be possible to achieve satellite systems which provide hundreds of thousands of channels.

Optical-fiber transmission systems currently have transmission capacities of about 70,000 channels per cable (400 Mb/s, 24 cores), and this should increase to about 500,000 channels per cable in the future with the implementation of 48-core-cable, 1.6-Gb/s systems. Comparing only line transmission capacities, optical-fiber systems appear to be superior in terms of transmission capacity. However, in the case of satellite communications, transmission routes can be formed simultaneously between multiple ground points, and transmission volumes for each section can be changed according to the traffic, giving these systems extremely high circuit utilization ratios. Hence care must be exercised to consider the network structure when comparing these two kinds of system.

The main restrictions in increasing the transmission capacities of satellite communications systems are the stationary satellite orbits and the frequencies which can be used, giving due consideration to the coexistence of other systems including ground-based systems. With regard to the joint use of frequencies with other systems, however, as noted in sections 2 and 3, this should not cause all that much restriction due to developments in joint-use technology. With respect to stationary earth orbits, moreover, there is the great expanse of the Pacific Ocean to the east of Japan, and Japan has relatively few nations surrounding it, so this limitation is not as severe in our case as it is for many foreign countries.

(2) Economy

As noted in 2.4(2), we can assume that land-based fixed wireless systems and optical-fiber transmission systems are about equally economical. The discussion presented in 2.3(2) can therefore be applied in economic comparisons between satellites and fiber optics. Comparing a large-capacity satellite having a scale of 100,000 channels with an optical-fiber system having a capacity of 30,000 channels, in cases where the circuit utilization efficiency is high, satellite systems are more economical at circuit distances of 1000 - 2000 km or greater. In cases where the circuit utilization efficiency is low, the circuit distances at which satellite systems become economical are shorter, and can be shortened to a fraction of the longer distances noted depending on the circuit utilization efficiencies of each system.

(3) Reliability

Optical-fiber systems share the fate of other cable systems in being sensitive to natural disaster. These systems suffer damage with earthquakes of magnitude 5 or so, and require tens of hours to be restored. They are also susceptible to storms, floods, and other natural disasters.

With satellite communications, however, fewer ground installations are required than with land-based wireless systems, and satellite systems are believed to have about 1000 times less probability of sustaining damage. Even if they do suffer damage, there are few facilities requiring restoration, making it possible to restore services in a short time.

(4) Conclusion

Due to their small capacities, satellite communications systems are currently used mainly for remote-island communications, disaster control, and extraordinary communications. As satellites are developed which have larger capacities, however, greater economies can be expected. We can expect special satellite networks to be built which take advantage of the wide geographical range and multiple-addressability of satellites, and the expansion of service areas in broadly-based networks. Thus satellite systems can be expected to be increasingly implemented, complementing land-based systems. Moreover, since satellite communications offer reliabilities which are far greater than those of optical-fiber systems, it is desirable that they be implemented in some proportion with optical-fiber systems, together with land-based wireless systems, in the field of general public networks also.

2.6 Radiowave Use in Fixed Communications

In this section, we seek to look ahead at the future shape of radiowave utilization, based on the technological trends discussed in the foregoing section. For that purpose, we will first take a look at the demand trends for intertoll trunks, which are supported by fixed communications, and for subscriber terminals, which constitute the basis thereof, considering the applicable areas for each type of fixed wireless system.

(1) Demand Trends

A. Projected Demand in Numbers of Subscribers

It is difficult to accurately grasp just how demand for subscriber terminals in public communications networks will change in the future, and this is particularly so with respect to 20 or 30 years hence, for which technological progress and changes in social structure are difficult to predict, but our best efforts at forecasting are represented by Figure V-2-13.

Total demand, including that for general subscriber telephone services, will exhibit only gradual growth. It is predicted that the present 41 million subscribers (1982 fiscal year end) will grow to 53 million subscribers 15 years from now (1997 FYE), and to 59 million 30 years from now (2012) (roughly 1.4 times the present figure). Meanwhile, demand for non-telephone terminals is expected to grow rapidly from fiscal 1987, and is expected to reach 20 million subscribers (38 percent of total demand) by 1997 FYE. Subsequently, the demand for non-telephone terminals will

continue to grow, mainly for home-use units, as people shift away from ordinary telephones, and is predicted to reach 40 million subscribers (roughly 67 percent of total demand) 30 years from now.

However, it must be noted that non-telephone terminals include such so-called narrow-band systems (64 kb/s) as facsimile and character graphics information systems (CAPTAIN), as well as wide-band systems (6.3 Mb/s) which handle moving images (television, etc.). The former is believed to constitute the overwhelming bulk of demand for terminals, but demand for the latter will be largely affected according to developments in demand for intertoll trunks, as will be discussed below.

Note: Various encoding methods are being studied for moving-image signal bands, from 1.5 Mb/s to 32 Mb/s, but we have here assumed an average of 6.3 Mb/s.

B. Projections for Intertoll Trunk Demand

The total number of intertoll trunklines for use in public communications was 1,260,000 circuits as of 1982 FYE, with the composition ratio between cable and wireless systems being roughly 1 : 1. The required number of circuits will increase along with the aforesaid growth in demand for subscriber terminals and the expansion of society's information activity, but the extent of this increase will be greatly affected by the demand for wide-band terminals. Taking the ratio for wide-band terminals 30 years from now as x percent, and calculating the required numbers of intertoll trunks with x = 20, 10, 5, 3, and 1, the results plotted in Figure V-2-14 are obtained. If 10 is assumed to be the maximum value of x, then some 14.4 million circuits, or 12 times the present number, will be required 30 years from now. If 1 is assumed to be the minimum value of x, then only 3.8 million circuits, or 3 times the current number, will suffice 30 years from now.

Note: The total for a circuit entering and exiting toll-center areas between locations (between originating and terminal points) is calculated as 1.

C. Projected Trends in Share by Intertoll-Trunk System

As already noted, the ratio between cable-system and wireless-system implementations of intertoll trunks is currently about 1 : 1, and, in the interest of future network stability, it is desirable to keep this share ratio near 1 : 1. Land-based microwave systems now account for about 50 percent (equivalent to roughly 630,000 channels) of intertoll trunks, and it is possible for these systems to handle the equivalent of about 1 million channels if facilities are increased on existing routes and analog systems are renovated. As discussed in 2.3(1), it is possible to gradually increase this capacity in the future, which means that a maximum of 4 million channels (or 8 million channels if single-frequency relays are

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implemented) can be handled using the existing routes of land-based microwave systems. If new route implementations are considered, it is possible to increase the maximum transmission capacity even further.

With respect to satellite systems, these cannot handle any large share of overall intertoll trunk traffic due to limitations of transmission capacity, but, due to the ease of circuit formation and the multi-dimensional connection features which they provide, satellite systems are nevertheless expected to function effectively as transmission routes in the coming age when wide-band terminals are used more widely. Moreover, since applications are effective in sections where the growth in circuit demand is pronounced, and in sections where cable-wireless balance cannot be achieved, satellite systems can be used to stabilize and upgrade networks.

In Figure V-2-15, example projections are given for circuit demand for intertoll trunk share, by system, taking the x of Figure V-2-14 as equal to 10. According to these projections, land-based microwave systems and satellite systems can be combined to cover about half of the demand 20 years from now, and about a third of the demand 30 years from now. If single-frequency relays are implemented, then half of the demand 30 years from now can be adequately handled by land-based microwave systems.

(2) Radiowave Utilization Modes

The present situation wherein public communications circuits account for the bulk of fixed communications circuits is not expected to change significantly in the future. However, as noted in the foregoing section 2.3.1, whereas the transmission of telephone calls has been the main operation up until now, in the future this will change, and the proportion of non-telephone transmissions (i.e. data, facsimile, and other digital signals, and video and other wide-band signals) will become higher. In order to cope with such demand growth and changes in demand structure, communications systems will have to be flexible. The importance of telecommunications to both society as a whole and to individuals will continue to increase, so the implementation of highly reliable telecommunications networks is a paramount social priority.

With respect to the various types of fixed communications, the following developments (discussed in 2.3 and 2.4) are expected.

a. Increased transmission capacity and lower costs for optical-fiber systems
b. Increased transmission capacity for land-based microwave systems through digitalization, etc.
c. Increased transmission capacity and lower costs for satellite systems through implementation of larger satellites

In view of what has been said, it should be seen that telecommunications networks must be established which integrate both convenience and economy

by using the features of optical-fiber systems, land-based microwave systems, and satellite communications systems in complimentary ways to meet the diversifying future needs for telecommunications. In land-based microwave systems and satellite communications systems in particular, the aforesaid objectives must be met while taking care to effectively utilize our limited radiowave resources.

A. Fixed Land-Based Communications

For microwave relay transmission routes, the 4 - 6 GHz band--which has a relatively wide bandwidth and is both convenient and economical--is desirable for use in future basic transmission routes. With this frequency band, the improvement of hardware features is relatively easy, and it is also easy to apply advanced technology, so it is possible to realize systems having high frequency utilization ratios and to contribute to the effective use of radiowaves. Also, since adequate bandwidth is also possessed by the 11 and 20 GHz bands, it is necessary to perfect technology and applications know-how for basic systems, extending the relay distances depending on route capacities, while using these bands for short-to-medium-range and long-range systems.

Subscriber systems have so far been based on metallic cable systems, but this imposes limitations on speed and on the transmission of wide-band signals, so that optical fiber must be introduced into these subscriber systems too. The implementation of wide-band wireless subscriber systems is necessary in order to provide diversified services.

For this reason, it is necessary to develop new milliwave bands for subscriber systems while seeking more efficient utilization of radiowaves through larger capacity wireless subscriber systems and channel demand-allocation technology.

Moreover, in self-managed communications systems, it is believed that fixed wireless communications are mainly used for reasons of economy and reliability, but here again it is necessary to use radiowaves more effectively through radiowave joint-use technology and highly efficient modulation techniques.

B. Satellite Communications

The frequency bands used in fixed satellite operations are the 6/4, 14/11, and 30/20 GHz bands. The 6/4 GHz band provides low rain attenuation and ease of hardware implementation, but the antenna aperture becomes large, making multi-beam implementation difficult, and there are problems with implementing large capacities. Currently, moreover, the interference conditions with land-based systems are severe, resulting in utilization limitations.

With the 30/20 GHz band, whereas rain attenuation is large and hardware costs are high, the bandwith is broad and multi-beam implementation is relatively easy, so large capacities can be implemented.

The 14/11 GHz band has characteristics intermediate between the 6/4 and 30/20 GHz bands. This band offers the greatest difference between the advantage of reception with the same antenna aperture and rain attenuation, making it an ideal frequency band from the standpoint of systems design.

In the future, as further advances are made in technologies for joint use with land-based systems, it is thought that joint-use of the 6/4 and 14/11 bands with land systems will become possible. With the 6/4 GHz band, earth stations can be put together economically, so it will probably be used for broadcast communications using dedicated receiving stations which have fewer problems with interference. The 14/11 GHz band is ideal for systems design and has few interference problems, so it will likely be used for various new services.

Key to Figure V-2-13 Demand Projections for Subscriber Terminals in Public Communications Networks

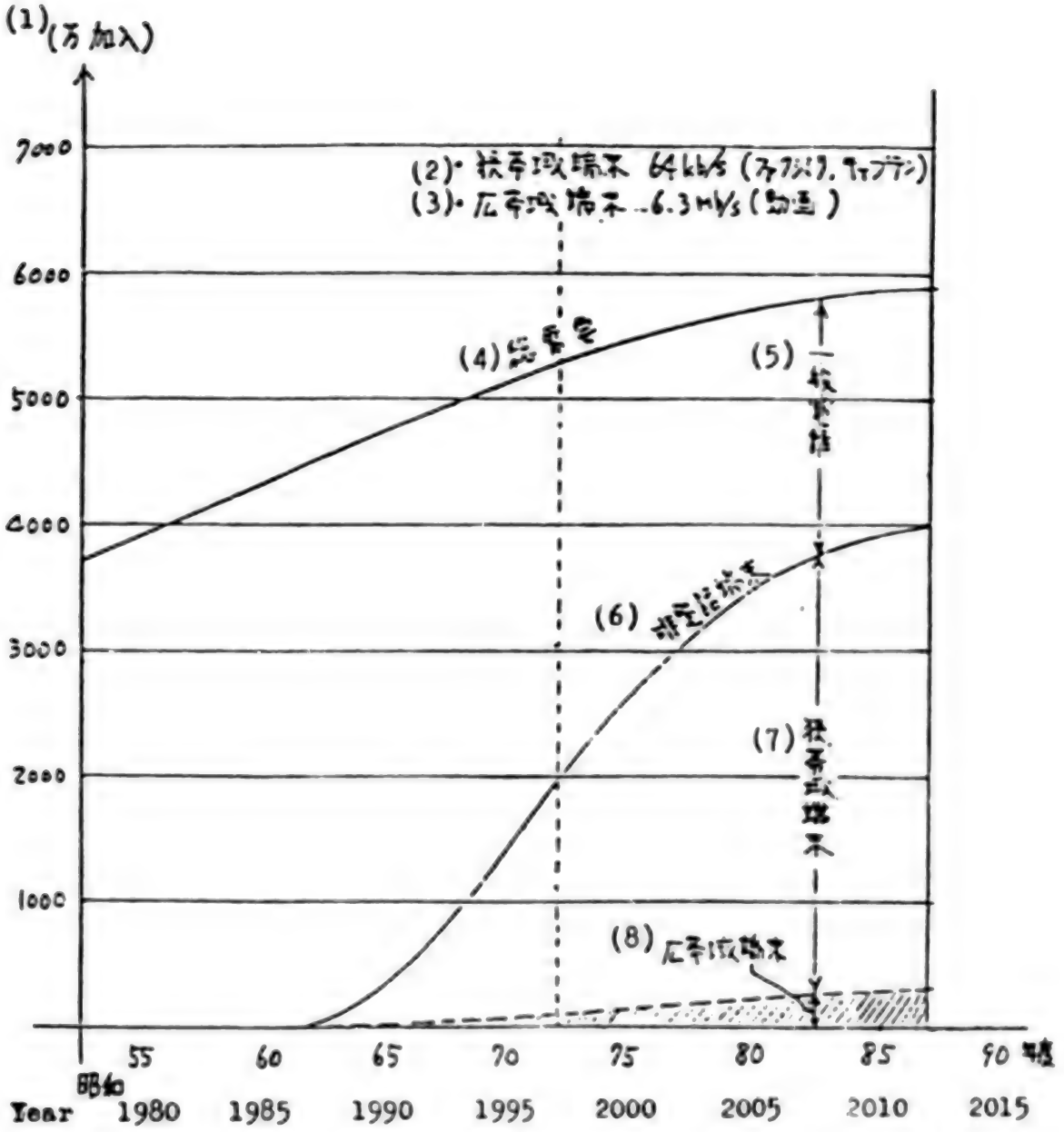
1. (10,000 subscribers)
2. Narrow-band terminals 64 kb/s (facsimile, CAPTAIN)
3. Wide-band terminals 6.3 Mb/s (video)
4. Total demand
5. Ordinary telephones
6. Non-telephone terminals
7. Narrow-band terminals
8. Wide-band terminals

Key to Figure V-2-14 Projected Demand for Intertoll Trunks

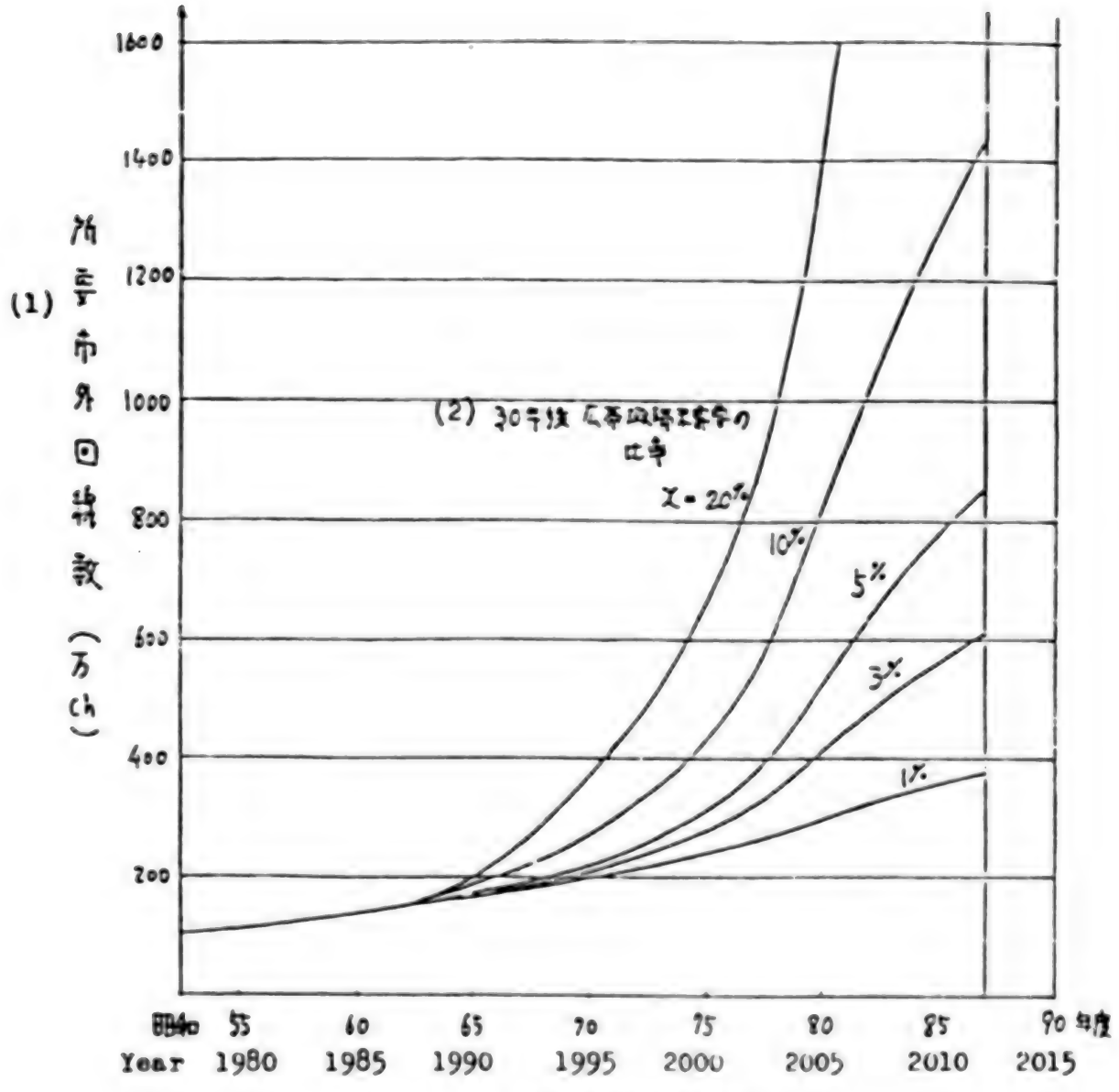
1. Number of required intertoll trunks (10,000 channels)
2. Demand ratios for wide-band terminals 30 years from now

Key to Figure V-2-15 Predicted Intertoll Trunk Proportions

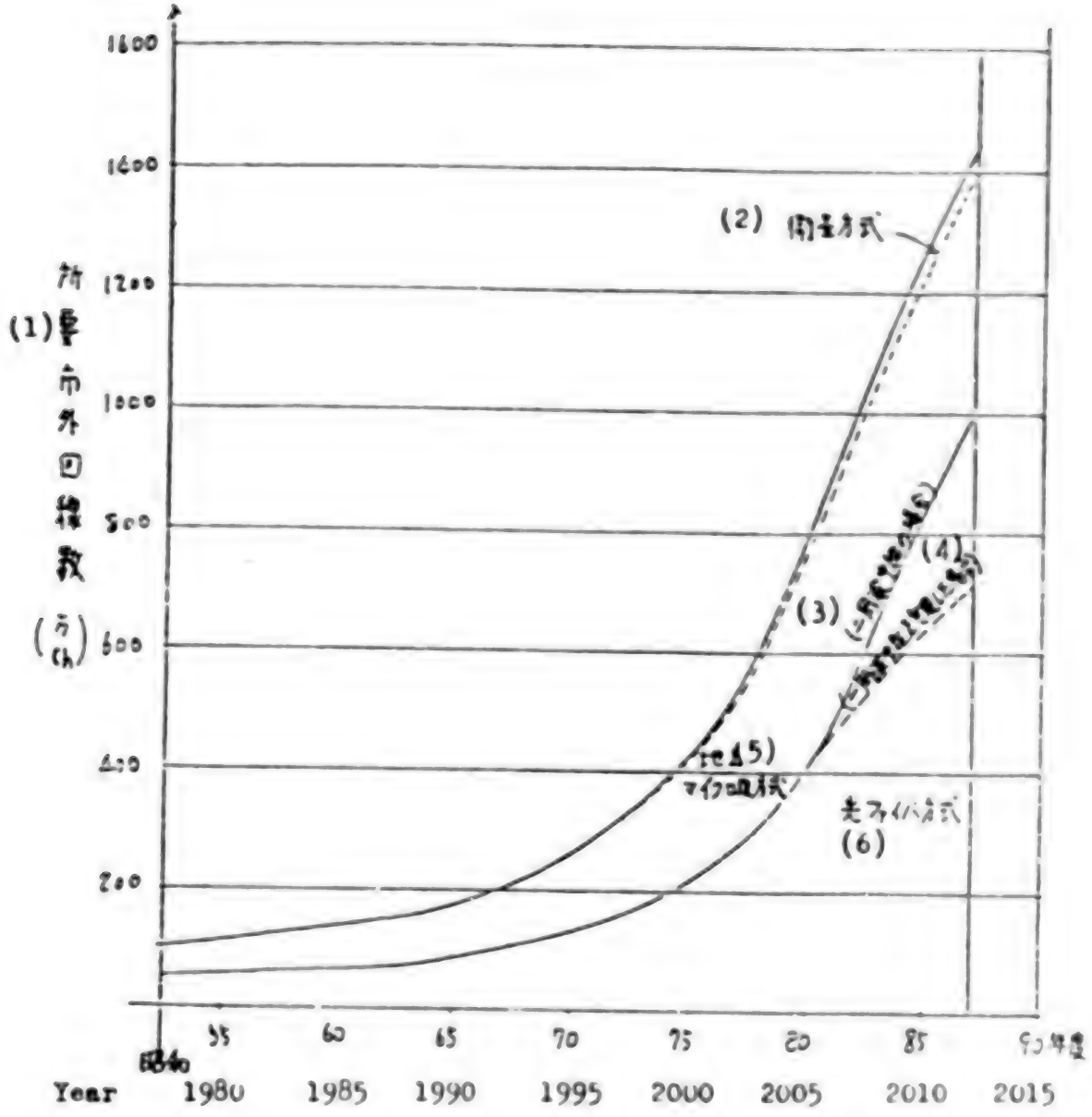
1. Number of required intertoll trunks (10,000 channels)
2. Satellite systems
3. (With 2-frequency relays)
4. (With 1-frequency relays implemented)
5. Land-based microwave systems
6. Optical fiber systems



図Ⅴ－2－13　公衆通信網における加入者端末需要予測



図Ⅴ－2－14　市外回線数の需要予測



図Ⅴ－2－15　市外回線分担比予測（広域域内発着量30年後10%）

3 Mobile Communications

3.1 Introduction

Communications between mobile units such as automobiles, aircraft, ships, and people, etc., can only be conducted via wireless means, and maximum attention has always been given here in distributing frequency resources. The upper limit of frequency bands usable in mobile communications has gradually moved higher, from VHF to UHF and SHF. As a result, frequencies formerly used only in fixed communications have come to be used in mobile communications as well.

At the present time, the 400 MHz band of fixed-use frequencies is increasingly being used in mobile communications, and it will likely be necessary to develop mobile communications applications for frequencies of the submicrowave bands (1 - 3 GHz) and higher. In employing these frequency bands, it will be necessary to provide for mobile-use frequencies according to a long-term plan, giving due consideration to existing facilities and the joint use of frequencies during transition periods.

Meanwhile, it goes without saying that we must endeavor to use presently used frequency bands even more efficiently, as in narrower band implementations in the 400 MHz band.

3.2 Mobile Communications--Current Situation & Trends

Land-based mobile communications can be largely divided between the public communications form and the dedicated communications form. These two categories can be further categorized according to utilization mode and into various kinds of system (cf. Figure V-3-1).

We will now examine the current situation and trends for mobile communications.

(1) Public Communications Form

Since beginning automobile telephone services in Tokyo in December, 1979, the service areas have been expanded to cover major cities throughout Japan, including Osaka, Nagoya, Sapporo, Fukuoka, Hiroshima, and Sendai, and the number of subscribers has grown to more than 25,000 stations. By the end of fiscal 1984, service areas are scheduled to be extended to cover all cities where government offices are located, as well as major expressways and highways. If the present rate of station growth is sustained, by the mid 1980's there will be a shortage of available frequencies, which will necessitate technological developments to enhance frequency utilization efficiencies through such measures as the following.

(1) Shortening wireless zone radii
(2) Reduction of required D/U ratios by space diversity

(3) Enhancement of channel utilization efficiencies by interference detection and during-call channel switching
(4) Narrowing of channel-to-channel intervals

In order to cope with the demand for non-telephone services such as facsimile and data communications, research is being done on advanced systems which employ digital technology.

Railroad telephone service has been provided for the Tokaido-Sanyo Shinkansen and the Tohoku-Joetsu Shinkansen since the commencement of train service on these bullet-train lines. The former system uses manual exchanges, and the callable areas are limited to those bordering the line. Studies are being done, however, on changing over to nationwide automatic exchange services, just as with the latter line, when facilities are renovated, and, simultaneously therewith, on improving the communications quality by using leaking coaxial cable and implementing smaller zones.

Ship telephone services were begun in November, 1964, using the 150 MHz band. Manual exchanges were used initially, but an automatic exchange system was implemented in March, 1979, using the 250 MHz band, after which the changeover from manual to automatic exchange systems was gradually implemented. More recently, research is being done on new ship communications systems which would use digital technology to meet demands for systems which are more economical and offer more functions. Also being considered is the utilization of satellite communications in order to provide wide-band services which would include high-speed data communications, in addition to automobile telephone services.

The international maritime satellite communications system has been expanding steadily since its inception in February, 1982, and the number of participating ship stations was 2,271 (including 275 Japanese ships) as of March 31, 1984. Continued steady growth is expected in the future, and if the digital small-craft earth station system now under development is implemented (planned for 1988 or so), the number of ship stations should jump dramatically. As to frequency bands, the 7.5 MHz zone of the 1.6 GHz band (for ship-to-shore) and 1.5 GHz band (for shore-to-ship) is being used currently. With the second-generation system which is to start from 1988, the same frequency band will be used for ship-to-shore (with a 20 MHz bandwidth) and shore-to-ship (15 MHz bandwidth) in order to increase the communications capacity. The frequency interval is presently 50 KHz, but this will probably be decreased to 25 KHz in the future to use frequencies more efficiently.

It is believed that ship telephones and automobile telephones will be followed by aircraft telephones. The United States is already at the stage of implementation in this field, and research and development are underway in Japan too for the purpose of implementation.

Cordless telephone service began on a nationwide scale in 1980, but frequency utilization efficiency was poor due to the use of one frequency for each subscriber, and the nurber of subscriber stations was only about 1300. Cordless telephone service which employs multi-channel access technology has now been started, and is expected to grow in the future. Also, with the advances in OA, research is being done on wide-band digital cordless telephones which use high frequency bands.

Pocket bell (beeper) service began in Tokyo in 1968, and the areas where the service is offered have increased, so that with the implementation of the service in Okinawa in 1982 all of the major cities in Japan are covered. The number of subscribers is now over 1.6 million, making it the most used of all the mobile communications services. During this time the frequency band was changed from 150 MHz to 250 MHz, a new digital signal system was implemented and the number of units serviced by each wireless channel was increased. In addition to these technological improvements, a dual call service is now available which gives assigns two numbers to a single beeper. New systems are now under development which will increase customer convenience by making the beepers smaller and cheaper while enhancing their functions.

(2) Dedicated Communications Form

Demand for police, fire-fighting, and disaster-control communications is expected to continue to grow as at present, utilizing the 60, 150, and 400 MHz frequency bands. In the area of disaster-control-related mobile communications, for the communications system which mutually connects the disaster-control-related organizations, only one wavelength is apportioned to each of the 150 MHz and 400 MHz bands as a common wavelength, and it will be necessary in the future to implement a multi-channel access system.

In the field of railroad communications, train control operations are now done using the 150 and 400 MHz bands, and demand is expected to continue to rise gradually. From the standpoint of improving more efficient utilization of frequencies, it will be necessary to make increased use of the leaking co-axial cables which are already used on the Tohoku Shinkansen.

Mobile communications for land transport, civil engineering and construction, and manufacturing and sales have conventionally been conducted on a multiple-user joint-frequency-use basis in the 150 MHz and 400 MHz bands, and in recent years the demand for these services in metropolitan areas could not be met. With the implementation of the MCA system, however, demand is being met for the present. MCA system services were begun in Tokyo in October, 1982, in Osaka in December, 1982, and in Nagoya and Kyoto in December, 1983. There are plans to expand the service to Yokohama, Kobe, Sapporo, and Fukuoka. The number of subscriber stations exceeds 20,000. The MCA system also supports facsimile and data transmission, and data transmissions for bus control operations are already being

conducted. These services are expected to be more widely used in the future.

The easiest of all the means of communicatio for various businesses to use is simplified wireless. The 150 MHz and 400 MHz bands have been apportioned to simplified wireless use, and the number of stations exceeds 6 million. The growth in this field is in excess of 15 percent anually and is expected to continue expanding at that rate for some time. When the office-automation wave reaches the simplified-wireless demand strata, data transmission and so forth will become necessary. In that case, transmission efficiency would decline with the current single-frequency multiple-user systems, so it will become necessary to provide stable high-quality services through the implementation of such new technologies as storage relays and time-sharing multiplexing systems.

In the field of personal wireless (amateur radio), in December, 1982, communications means were implemented which could be easily used for business, leisure, or hobby purposes, and more than 500,000 stations are already operational. In the future, as discussed in IV-5, this field will see digitalization and the use of higher frequency bands.

Aircraft mobile communications can be largely divided between aircraft traffic control communications, air transport control communications, and other communications. In this field, as of the end of 1982, there were 864 ground stations and 1506 aircraft stations.

Aircraft traffic control communications are conducted between air traffic control installations and aircraft to insure the safety and orderly navigation of aircraft. These communications are conducted via radio telephone, using 2 - 17 MHz short-wave bands for aircraft navigating over the ocean and the 118 - 136 MHz VHF bands for aircraft operating over land.

Air transport control communications are communications conducted between air transport companies and aircraft for the purpose of regulating air transport operations. Most of these communications are via VHF radio telephone. Airliners which travel international routes conduct these communications via foreign aircraft agencies using HF bands.

Other communications in the aircraft field include communications conducted by businesses which use aircraft in their operations, such as crop dusting and air photography businesses. These communications are conducted via VHF radio telephone. Fishing communications can be largely divided between those which communicate information on fishing operations per se, and those which involve instructions to and administration of fishing vessels. As of the end of 1982, there were 687 shore stations and 29,646 ship stations operating in this field. Classified by systems, there are the long-distance communications systems which use medium-shortwave and shortwave bands for deep-sea fishing operations, and the short-distance communications systems which use the 26 MHz, 60 MHz, or 150

MHz bands for offshore fishing operations. As to the latter, in recent years an increasing percentage of small fishing vessels in the 10-ton and under class have been provided with radio communication facilities, and a new fishing communications system has been developed which uses the 40 MHz band.

3.3 Radiowave Utilization in Mobile Communications

It is predicted that the importance of mobile communications will become even greater in the future, and that demand will intensify for both greater volumes and better quality. As mentioned in the Introduction, mobile communications services are impossible without radiowave utilization, which means that it will continue to be necessary to do everything possible to provide the necessary radiowave resources to meet the demand of mobile communications.

For this reason, it will be necessary to take measures to enhance our capacity to accommodate mobile communications subscribers by integrating various systems, developing efficient utilization technologies for radiowaves, and pioneer new frequency bands for mobile communications use.

The following two categories of use exist in fields which require mobile communications.

(1) Communications for mobile units which actually move around (persons, automobiles, trains, ships, aircraft, etc.)
(2) Communications which, for the sake of convenience, replace cable systems with cordless systems using radiowaves.

The following informal table gives predictions for the year 2000 for the main services which require relatively wide frequency bands and for which widespread use is expected.

Automobile telephones	4.5 million (10 percent of all vehicles)
Main metropolitan areas:	1.15 million (25 percent of whole country)
Portable telephones	1.2 million (1 percent of population)
Main metropolitan areas:	300,000 (25 percent of whole country)
Railroad telephones	1000
Ship telephones	50,000 (5-ton vessels and up)
Maritime satellite com	100,000
Aircraft telephones	1000
Cordless telephones	7 million (10 percent of telephones)
Main metropolitan areas:	1.75 million (25 percent of whole country)
Pocket bells (beepers)	6 million (5 percent of population)
Main metropolitan areas:	1.5 million (25 percent of whole country)
Police, fire dept, etc	600,000
Integrated disaster control	600,000
Various types business com	4.8 million (4 percent of total population)
Main metropolitan areas:	1.2 million (25 percent of whole country)

Amateur & personal radio	6 million (5 percent of population)
Main metropolitan areas:	1.5 million (25 percent of whole country)
Fishing radio	400,000

In order to cope with these demands, it will be necessary to efficiently utilize the presently used frequency bands at 1 GHz and below by narrowing the bandwidths, etc, and to establish a band approximately 400 MHz wide in the 1 - 3 GHz frequency range. In addition, in order to respond to demands for video transmission and high-speed data transmission, it will be necessary to further develop the SHF and EHF bands and also the optical regions.

In the mobile communications of the future, while establishing the needed bandwidths noted above, in metropolitan and other areas of high frequency-demand, it will be necessary to work toward the repeated use of frequencies by means of leaking coaxial cables and low-power facilities. Other important considerations include the elucidation of transmission conditions under various situations, zone configurations, and research and development in such areas as system configuration technology, making portable units smaller and lighter, digital mobile communications, and more sophisticated satellite-using mobile communications systems.

Key to Figure V-3-1 (cf. next page):

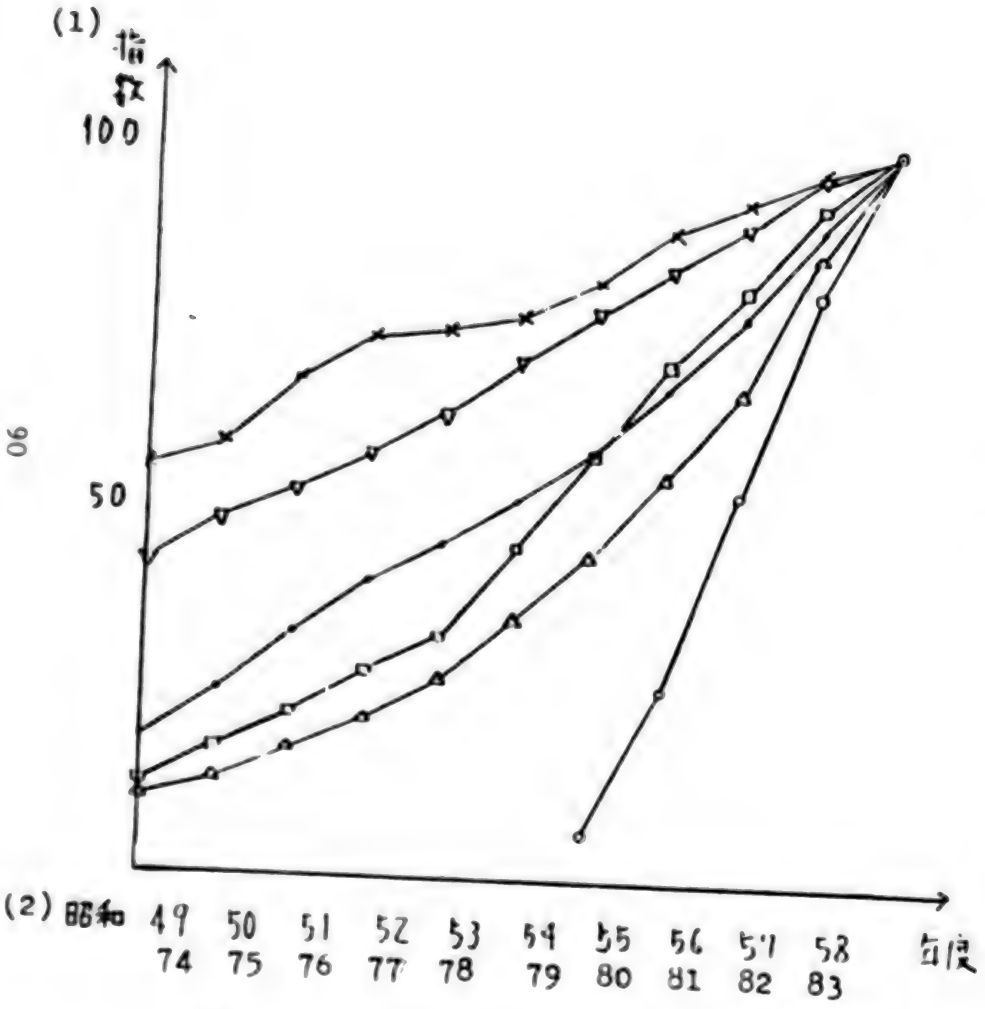
1. Index
2. Year Showa (Julian year abbreviated below in original)
3. Number of stations
4. Automobile telephones
5. Ship telephones
6. Pocket bells (beepers)
7. Important communications
8. Business communications
9. Commercial fishing communications

4 Broadcast Communications

4.1 Introduction

Broadcast communications (broadcasting) began as audio broadcasting (medium-wave) and developed through black & white television, color television, and ultra-short-wave broadcasting. In addition, television-audio multiplexing, television-character multiplexing, and satellite broadcasting have been implemented. Hence broadcasting has steadily advanced together with the development of other high-level technologies.

Meanwhile, since there are limitations on the number of frequencies in a limited number of frequency bands which can be allocated so as to satisfy minimum interference standards, requests are concentrated on a small



(3) 局数(59.3)

(4)	○—○	自動車電話	24,870
(5)	×—×	船舶電話	12,068
(6)	•—•	ポケットベル	1,605,742
(7)	▽—▽	重労通信	261,760
(8)	△—△	各種業務	182,231
(9)	□—□	簡易無線	580,396

図V－3－1　陸上移動局等の増加傾向と局数

Figure V-3-1　Numbers of Land-Based Mobile Stations and Growth Trends

number allocable frequencies. This trend is especially pronounced in the broadcasting field, reflecting the needs of the populace for broadcasting.

In authorizing new broadcast services, a number of things must be considered, such as the public need for such new services, the profitability of the broadcasting company, and the impact on existing broadcast services. We here wish to provide an outlook on future radiowave utilization in the broadcasting field.

1.2 Future Trends for Existing Broadcast Media

The existing media of radio broadcasts (medium-wave, short-wave, FM) and television broadcasts have become a well-established and indispensable part of modern society, matching the characteristics of each medium with the its users' needs, and, as such, have reached the level of full maturity. We need here to look at the future of radio and television as applications are being made (and even newer ones being developed all the time) in new broadcast media which have characteristics not shared by the existing media.

(1) Audio Broadcasts

Medium-wave broadcasting has been going on for about 60 years since the inception of broadcasting, and provides nearly 100-percent coverage. Wide areas can easily be serviced due to the characteristics of medium waves, and, since the receivers can be small, lightweight, and portable, they can be easily operated while moving. For these reasons, this medium is used as a convenient means of obtaining information through implementations of television broadcasts which feature high-quality FM audio broadcasting and video.

Medium-wave broadcast radiowaves can be transmitted over long distances at night utilizing ionospheric transmission. This has given rise to increased radiowave interference from abroad in recent years, and, in domestic regions where the magnetic field is strong, it is sometimes difficult to receive certain radio frequencies. Accordingly, countermeasures must be taken to correct this situation.

In light of this situation, it is likely that medium waves will continue to be used in the future for the transmission of news, weather, and traffic advisories, due to their characteristics, even if various new broadcast media are implemented. In particular, these medium-wave broadcasts play a great role in providing information for victims during disasters, and, due to the ease of reception, this role is not likely to change in the future.

Turning to shortwave broadcasts, these will no doubt continue to be used for international broadcasts aimed overseas, due to their characteristics, since they help in obtaining understanding from foreign countries by

disseminating Japanese PR material and since they provide information for Japanese citizens residing abroad. With respect to domestic shortwave broadcasts, moreover, for reason of radiowave propagation [illegible], there are inherent limitations on broadcast content. We are likely to see continued support for self-managed services aimed at active shortwave users.

With respect to FM broadcasts, NHK now implements one broadcast everywhere, but there are still unassigned areas for private broadcasts, and the number of stations which can receive FM transmissions in the same area are small, so the demand for setting up stations is strong. FM broadcasts provide better audio quality than medium-wave broadcasts and also support stereo transmissions, so they are ideal for broadcasting music and permit easy reception using a simple antenna. With the advent of satellite broadcasts we are now seeing even higher-quality broadcasting being done using PCM [pulse code modulation]. At any rate, because of its high quality and ease of reception, FM broadcasting will continue to grow in the future.

(2) Television Broadcasts

Television broadcast services presently cover almost the entire country, with the exception of certain remote areas and islands. As discussed in chapter III, however, there are many areas, excluding large metropolitan areas, where only four or five channels can be received, and there is strong demand for more channels in these areas.

Also, with the development of VHF and UHF broadcast networks in neighboring countries, there are more and more cases of continual or seasonal interference, which are affecting an increasing number of households, and there is a strong demand to do something to correct this situation. Meanwhile, in the cities, there are more incidences of television reception blockage due to high-rise buildings with every passing year, and those involved are working hard to solve the problem.

There are high expectations for the implementation of satellite television broadcasts and for various new types of broadcasts such as high-resolution television for the future. At any rate, present television broadcasting is sure to continue to develop as it takes advantage of capabilities for providing locally orientated services.

(3) Radiowave Utilization in Program Production

Together with greater diversity in techniques for producing television and radio programs, there are greater opportunities for producing programs outside of the station. In particular, given the advantages of simultaneous live broadcasting and rapid media information gathering, which broadcasting makes possible, there is a trend toward increasing numbers of circuits used simultaneously, by means of increased utilization of

wireless relay circuits and multi-faceted utilization. This trend is not likely to change in the future as the flexible features of wireless circuits are demanded. These matters must be considered together with interconnecting radio frequencies.

The increased use of wireless cameras and wireless microphones, which use short-distance radio transmissions, is also providing greater flexibility to program producers, and such utilization of wireless circuits as these must also be taken into consideration.

4.3 Future Trends in New Broadcast Media

The new media are making it possible to provide people with a wider variety of richer broadcast services which are better adapted to the increasingly diversified personal values being held. In view of the trends seen in technological development and in the general level of public interest, it is most important that we give adequate attention to satellite broadcasting which will provide multiple-channel, high-quality services using new frequency bands and multiplexed broadcasts which complement existing broadcast media.

(1) Future Trends in Ground-Based Broadcast Media

As discussed in section 4.2, with new broadcast media which use broadcast waves in frequency bands already used, since it is difficult to obtain new channels, systems are being devised which employ multiplex broadcasting on existing broadcast waves and new broadcast-use frequency band utilization.

With multiplex broadcasting, television-audio multiplexing and television-character multiplexing (pattern mode) have been implemented, with the former covering about 80 percent of existing households, with the number of receiver deliveries reaching 7.95 million units at the end of 1983. Continued development is expected for the future. Television-character multiplexing is being implemented mainly to benefit those with impaired hearing. Following on from this, in the future, it is hoped that we will see active implementation of secondary and independent utilization with respect to major television programs through a new hybrid mode employing the advantages of both the pattern mode and the code mode.

In addition to the above, studies are also being done on facsimile and data transmission services to be multiplexed on television and FM broadcasts.

Also being considered are systems which use new frequency bands such as 22 GHz or 41 GHz and are aimed at sharply increased information volume and better quality. However, due to the propagation characteristics of these frequency bands, they will probably be used mainly for services oriented toward limited regions within a radius of a few kilometers, with nationwide services being handled by satellite broadcasts. High-resolution

television broadcasting and still-frame video broadcasting are being considered among these services.

It will also be necessary to study the use of new frequency bands for the purpose of out-of-station program relays which will be necessary for producing programs for the new broadcast media such as high-resolution television broadcasting.

(2) Future Trends in Satellite Broadcasting

Satellite broadcasts can cover the entire nation all at once and facilitate audio and video broadcasts of a quality which cannot be matched by ground-based systems. The following uses can therefore be realized, which will make satellite broadcasting an important structural element in the high-level information society.

A. Reinforcement & Expansion of Ground-Based Television Broadcasts

NHK estimated that, at the end of fiscal 1983, some 420,000 households were getting poor or no reception of ground-based broadcasts. A policy of using broadcast satellites has been adopted in order to fundamentally solve this problem, provide a broadcast network for emergency use, and provide broadcast services to remote islands which cannot be adequately reached by ground-based broadcasting.

With satellite broadcasting, high-quality services can be provided, and the service area is broadened to cover the entire country. For these reasons, it is projected that a considerable number of new viewers will be served, and the pay-TV method is being proposed as a source of revenue. Concerning pay television, a number of methods must be considered from a systems standpoint, including scrambling, decoding key, and direct fee collection.

With satellite broadcasting, which features wide area coverage, it is difficult to achieve the kind of local-oriented broadcasting which can be done with ground-based broadcasts. However, multi-beam by-locality satellite broadcasts are being conceptualized which would aim spot-beams with large-scale transmitter antennas and use frequencies of 22 GHz and above. Feasibility studies will likely be done on these systems as further technological advances are made.

B. New Broadcast Methods

In the field of satellite broadcasting, we should study the feasibility of high-resolution television broadcasts and PCM audio broadcasts which are expected to arouse new consumer demands as well as comply with diversifying viewer expectations.

With respect to high-resolution television broadcasting, the equipment (cameras, VTR's, etc) necessary for program production have about reached the stage of practical implementation, but it is desirable that R&D be directed toward the incorporation of new-function displays and large-capacity video memory units into home-use receivers, and toward the shrinking of bandwidths during broadcast wave modulation so as to effect narrower frequency bands.

In high-resolution television broadcasting, the ideal method to use is satellite broadcasting which provides transmission routes which eliminate such quality deterioration as ghosts. However, in the case of services limited to a small area, as mentioned in (1), ground-based broadcast systems are also being devised which use such new frequency bands as 22 or 41 GHz, which could result in an integrated satellite-ground system if both technologies are implemented.

PCM audio broadcasts make exclusive use of one TV-channel portion and yet facilitate the simultaneous transmission of several dozen channels of high-quality monoaural audio or 15 channels or so of compact-disc-grade high-quality stereo audio. There are therefore high expectations for PCM as a broadcasting medium for music.

Another type of satellite-based broadcasting is exclusive-wave-type still-frame broadcasting for which it is difficult to obtain frequencies with existing ground-based broadcasting. Using a single television channel, it is possible to broadcast television programs made up of still-frame images from about 50 programs, including audio. Viewers would be able to select and receive the desired program from among these at any time, making it possible to diversify information as well as broadcast local information which is difficult to do with satellite broadcasting.

Other developments which are awaited in hopes of more effectively using radiowave resources are television-audio and television-character multiplexing, which is being implemented with ground-based systems, as well as facsimile- and data-broadcast multiplexing (now being studied). Satellite broadcasting could be used to provide nation-wide character multiplexing, facsimile broadcasting, and data broadcasting, and broadcast a large volume of information as well as broaden information selectivity. Such implementations are desirable.

By implementing a flexible, multiplexing structure which would integrate various types of digital signals such as PCM audio broadcasts, digitalized still-frame broadcasts and character-multiplexed broadcast signals, and digitalized facsimile signals, it is possible to develop the so-called integrated digital broadcasting which integrates various services. With such integrated digital broadcasting, it would be possible to provide such audio-visual services as high-quality music broadcasts complete with music score or still frames, and story reading complete with text. It is hoped that much research will be done in this field in the future.

With respect to program production for such new broadcast media, in order to provide more diversified program content, the use of out-of-station relay circuits is predicted, as is the geographical widening of program-relay points. In this field, wider use is expected to be made of satellite circuits as one out-of-station relay means.

C. Other

Cable TV has grown rapidly during the past several years in the United States, where cable TV programming is provided nationwide, using satellites, since the FCC authorized pay TV. In Japan's case, it is still difficult to tell whether, economically considered, we can expect to see the same sort of pace, but multi-channel cable TV is expected to develop out of measures taken to solve the problems of poor reception in remote areas and obstacles to reception found in cities. Land-based wireless circuits will be used in addition to satellites in providing these cable TV programs.

4.4 Radiowave Utilization in Broadcasting

In order to respond to broadcast media pluralism and user needs, it is necessary to take measures to improve reception and balance increases in the number of channels available for present land-based broadcast media in all areas of the country. Since there are international distribution restrictions on frequencies, we need to develop technologies for more effective use of the limited frequencies--technologies like multiplex broadcasting or simultaneous broadcasting--and aim at actually redeveloping our frequency resources.

With respect to satellite broadcasts, we should bring more diversified services on line in the presently allocated frequencies. We also need to respond to user needs and seek to implement such new broadcast media as high-resolution television and PCM audio broadcasts as technological advances are made in these fields.

Japan is ahead of other nations in the development of such new broadcast technologies as satellite broadcasting, high-resolution television and facsimile broadcasting, and we are expected to play a leading role in these fields.

As we seek to use frequencies more effectively and respond to diversifying viewer and listener demand, expectations are high for the development of integrated digital broadcast technology which can provide various types of service with great flexibility. In order to achieve integrated digital broadcasting, consideration must be given not only to the 12 GHz band, but to higher frequency bands such as 22 and 41 GHz.

It is believed that broadcast systems using such new frequency bands as 22 and 41 GHz will be mainly based on satellite broadcasting, so that it will

complement the land-based broadcasts which use the same frequency bands. It is necessary to make our best efforts toward developing technologies for these frequency bands.

In order to cope with the diversification of program production techniques, due consideration needs to be given to out-of-station program relays and broadcast support operations, in addition to broadcast networks.

5 Other Radiowave Utilization

5.1 Introduction

There are many types of radiowave use outside of the communications field. These uses include ship and aircraft safety operations, radiolocation and navigational aids, remote sensing and data links, high-frequency energy (ISM) applications, radio astronomy and geodetic surveying, standard frequencies and time synchronizing, and such weak-signal radiowave applications as wireless microphones, remote controllers, and short-distance sensors.

These uses may be categorized as follows from the standpoint of frequency utilization trends.

-- Applications wherein the frequency utilization range changes according to demand volume (remote-sensing data links, weak-signal radio equipment, etc.)
-- Applications wherein the frequency utilization range does not change according to demand volume (remote sensing, geodetic surveying, ISM, etc.)

These are not fundamental categories, but vary with the utilization mode, etc. Remote sensing and radio astronomy are applications which will be impacted by frequency utilization as technological advances are made.

5.2 Radiolocation, Navigational Aids, Remote Sensing

There are numerous systems which use radiowaves for the purpose of making the navigation of ships and aircraft safer and more efficient. These include GCA (ground controlled approach), radio altimeters, radar, VOR (VHF omnidirectional range beacon), ILS (instrument landing system), TACAN, DME (distance measuring equipment), doppler navigators, and Loran-C. More recently, systems using radio-navigation satellites have been implemented, such as NNSS (navigation satellite system) and NAVSTAR (navigation satellite). Thus radiowave utilization is developing toward radio-navigation systems offering greater precision.

Demand is also increasing for radiowave uses for remote sensing operations conducted from aircraft and satellites. In particular, demand for data links is growing very rapidly.

5.3 High-Frequency Energy Utilization

The applications in this field are extremely diversified, including household appliances such as electronic ranges, medical equipment that uses high frequencies, and various types of industrial equipment which uses the thermal energy generated by high-frequency currents in processing metals and synthetic resins, etc. Demand is expected to grow more and more, but it is necessary that the joint-utilization with radio communications be considered here, and that techniques be developed for protecting against unnecessary radiation.

5.4 Radio Astronomy, Geodetic Surveying, Standard Frequencies, & Time Synchronizing Applications

Unlike optical telescopes, radio telescopes can be operated in the daytime, and high resolution has been achieved by means of technological advances. These radio telescopes are being used as powerful tools in investigating the form of our dynamic universe, the mechanism whereby molecular clouds develop into stars, the phenomenon of the explosion of the Milky Way, and the structure of the history of the universe.

Observations are also made with frequencies beyond radio frequencies, such as infrared, visible light, ultraviolet, X rays, gamma rays, etc. These observations are made outside the atmosphere, i.e. by means of satellites. Advances are also being made in direct observations of heavenly bodies by means of planetary exploration vehicles.

Also, through developments in very long baseline interferometry (VLBI), we are now able to make measurements with a precision of a few centimeters from great distances. This has not only facilitated highly precise studies of intercontinental distances and lithospheric plates and aided long-range earthquake predictions, but related research is being done in observations of terestrial rotation, high-precision intercontinental time comparisons, and high-precision determinations of satellite orbits.

Because of fluctuations in transmission channels, etc., there are limitations on precision with shortwave and longwave standard radiowaves used for providing frequency and time-interval standards and standard times, both domestically and internationally. The precision of the atomic clock is 10^{-13} or better, and short-term stabilities of 10^{-15} have been achieved. For simultaneous observations covering wide areas such as in astronomy and VLBI, it is becoming necessary to synchronize clocks around the world with a precision of 100 ps. Research is being done on systems which use distance-measuring signals from communications satellites or

stationary weather satellites, or TV synchronizing signals from broadcast satellites, for the purpose of synchronizing clocks over great distances.

With the provision of such standard signals, highly stable frequency control will become easy to achieve, which will promote the more efficient utilization of radiowaves.

5.5 Weak-Signal Radio Devices

Weak-signal radio devices are used in a great variety of ways in many fields, and increasingly extensive use is expected, overall, for the future.

From the perspective of consumer-oriented equipment, the wireless microphone has been in wide use for quite a long time, and will no doubt continue to be used in the same way in the future. Increasing use is also expected for cordless telephones which support bidirectional communications and home remote controllers and sensors as advances are made in leisure communications and home automation (HA).

From the viewpoint of commercial equipment, as progress is achieved in implementing office automation (OA) and factory automation (FA), it is believed that there will be increasing utilization of weak-signal radio units designed with LAN access in mind, and of weak-signal radio applications in controlling various machines (processing machines, cranes, lifts, robots, etc.) at factories and work sites.

Applications are also being considered which would employ short-range sensors using even higher frequencies. These applications include systems for trespass prevention, theft prevention, collision prevention, and short-range radar.

In all of these cases, as the demand for weak-signal radio devices grows, it is believed that the range of necessary frequencies will broaden.

The frequency bands used for weak-signal radio devices include many of the frequency bands used for communications. Accordingly, a report has been circulated in the Radio Technical Council concerning regulatory methods and stipulated values for allowable levels for weak-signal devices. This report calls for stipulated values that are lower than the previous ones in the frequency domain of 322 MHz - 150 GHz, and clarifies the methods of measuring these values.

These weak-signal devices are expected to become more sophisticated. At the present time, FM and AM are widely used for these devices, but studies are being done on spectrum-dispersion methods which [illegible] not susceptible to interference and which produce very little interference in other systems.

VI Future Systems Which Will Use Radiowaves

The informationalization of society is occurring in all fields, and it is predicted that society will develop into the so-called high-level information society in which systems are closely linked together into a composite structure. In order to most efficiently achieve this goal, work is going forward on the establishment of a telecommunications business law.

Recognizing the environmental changes which have come about through previous and present changes in telecommunications administration, and giving careful consideration to the trends in the needs of society for the technological innovations and communications discussed up through the last chapter, we now wish to conduct an integrated study into the matter of which radiocommunications systems should be most actively developed and implemented in order to achieve the high-level information society. These will be presented from the following perspectives.

(1) The construction of nationwide communications networks which have the transmission capacity to cope with future large communications volumes

(2) The creation of a technological environment which will permit telecommunications businesses to use radiowaves and allow newcomers access to the field, assuming the efficient streamlining of present communications networks

(3) The promotion of widespread use of mobile radio by the populace, and the provision of a non-interrupted communications environment to Japan's citizens

(4) The implementation of new broadcast media which will provide viewers with high-quality, diversified broadcast services

In selecting systems to cope with these various demands, new technology should of course be incorporated as much as possible, and the following two points need to be emphasized.

(1) The inclusion of technological development important from the perspective of more efficient radiowave utilization

(2) Development of epoch-making media to cope with new communications needs

Throughout this chapter, short-range goals will be those aimed at 5 years from now or so, medium-range goals will aim at 10 years or so from now, and long-range goals will be targeted for yet more distantly future times.

VII Conclusion

Concerning the trends in radiowave utilization forcast for the next 20 years, in chapter 1 we presented an introduction, noting the goals and significance of this inquiry, and seeking to give an overall view of technological developments and utilization coordination with respect to radiowaves. In chapters 2 and 3 we presented forecasts and analyses concerning technological advances in radio and communications and the diversification of communications demand. Then, in chapter 4, we discussed future communications systems such as the increasingly sophisticated ISDN, ISDB, and integrated mobile communications systems, as well as the development of digital integration and the high-level utilization of satellite communications networks. Based on the findings of these studies, we sought to present a view of the future of radiowave utilization in chapter 5. The main points of chapter 5 are as follows.

(1) Radiowave Utilization in Fixed Communications

In the field of fixed communications, increased implementation of optical fiber cables is expected, but wireless systems will continue to vie economically with cable systems. In the interest of network reliability, both types of system must be used equally extensively so as to complement one another. Moreover, with respect to land-based communications and satellite communications applications of radio, these must be used together, sharing roles according to their several characteristics. At the same time, frequency joint-use technology must be perfected so that radiowaves can be used more effectively, and communications networks must be made even more sophisticated by integrating both of these media.

(2) Radiowave Utilization in Mobile Communications

With respect to mobile communications, increased demand is forecast for land-based mobile communications, but it is necessary to actively utilize the radiowaves in the sub-microwave bands and above, while seeking greater sophistication in mobile communications, including marine and aircraft mobile communications.

(3) Radiowave Utilization in Broadcasting

With respect to radiowave utilization in broadcasting, in order to respond to the diverse needs of the marketplace, we must not only seek to upgrade land-based and satellite broadcasting, but actively promote the utilization of satellite broadcasting in the interest of achieving high-resolution television and ISDB.

(4) Other Radiowave Utilization

We have discussed trends in radiowave utilization in other fields as well, including (1) radiolocation, radio navigation, remote sensing, (2) high-

frequency energy applications, (3) radio astronomy, and (4) weak-signal radio applications.

In chapter 6 we proposed the following nine categories of radiowave-using systems which should be actively developed in order to achieve the high-level information society.

(1) Large-capacity digital radio systems
(2) Fixed satellite communications systems
(3) Metropolitan exclusive wide-zone radio systems
(4) Portable mobile communications systems
(5) Portable satellite communications systems
(6) New MCA systems
(7) New personal and amateur radio systems
(8) High-resolution television broadcasting systems
(9) Integrated digital broadcasting systems

As information becomes further diversified in Japanese society as we head for the 21st century, communications networks which support sophisticated functions will be indispensable as media for high volumes of diverse information in the high-level information society of 15 or 20 years from now. Accordingly, telecommunications will play an increasingly vital role in society.

In the future, as demand for radio communications increases year after year, the utilization modes will also change. Certain measures must be taken to cope with these changes and the increased demand. Frequency utilization plans must be clearly formulated, and, while reinforcing the guidance functions, the development of frequency resources must be promoted by policies that are aggressive and yet appropriate. Furthermore, as telecommunications become more sophisticated and diversified, radiowave utilization must be both sophisticated and efficient, and appropriate standardization policies must be established as these advances are promoted.

In light of the foregoing, we recommend that, upon thorough assimilation of this inquiry, the effective utilization of our limited frequency resources be aggressively and smoothly promoted, and propose that the following policies be pursued with respect to radiowave-using systems that are expected in the future and for which definite development objectives have been established.

(1) The establishment of comprehensive and long-range frequency utilization plans (radiowave utilization planning)

(2) The establishment of comprehensive and long-range objectives for the development of frequency resources (radiowave utilization technology development)

(3) The promotion of technological development by users and manufacturers, in line with the development objectives of (2) above, together with the pursuit by the government (in cooperation with users and manufacturers when necessary) of well-planned technological development

(4) The setting up of the necessary administrative framework for promoting appropriate standardization

12332
CSO: 8129/0111

BRIEFS

SATELLITE AGREEMENT--Tokyo, 1 May KYODO--Japan and Australia have concluded an agreement to cooperate in making better use of a Japanese meteorological satellite, the Japanese Government announced Wednesday. Japan will utilize Australian ground stations to improve the accuracy and effectiveness of the geostationary satellite, Himawari (Sunflower)-3, launched last August, government officials said. In return, Japan will provide Australia with special meteorological observations made by the satellite, the officials said. [Text] [Tokyo KYODO in English 0335 GMT 1 May 85 OW]

CSO: 5500/4518

BRIEFS

ADDITIONAL TV PROGRAM ON AIR--Dear listeners, the national television station will increase its telecasts from four to five per week. The additional program will be telecast every Wednesday, beginning on the evening of 1 May. This means that the station telecasts its programs on every Tuesday, Wednesday, Thursday, Saturday, and Sunday. These programs begin at 1930 [1230 GMT] on those days. [Text] [BK010850 Vientiane Domestic Service in Laos 0500 GMT 29 Apr 85]

CSO: 5500/4329

JPRS-TTP-85-015
31 May 1985

PEOPLE'S REPUBLIC OF CHINA

IMAGE TRANSMISSION THROUGH OPTICAL FIBER

Beijing TONGXIN XUEBAO [JOURNAL OF CHINA INSTITUTE OF COMMUNICATIONS] in Chinese Vol 6, No 1, Jan 85 pp 60-64

[Article by Liang Guotai [2733 6753 3141]* and Facq Paul**]

[Text] Abstract: Two experiments on direct transmission of two-dimensional images by optical fibers without any electronic scanning nor photo-electronic conversion are presented. Firstly, the transmitted images are 5x7 points characters. Secondly, the transmitted images are colored pictures with medium resolution.

Introduction

Techniques for the transmission of a two-dimensional image through an optical fiber has given rise to many proposals and discussions.[2,4-7]

We have presented in a previous article, a transmission method for a 10x10 points image through a single multimode fiber.[1] Nevertheless, the system suffers from some cross-talk, due to spectral perturbing at the input end of the transmission fiber. Due to the direct chromatic coding used in this system, every image element is assigned to a spectrum element whose mean wavelength λ is a monotonic function of position in the image. Thus, the received image is "rainbow" colored.

Two experiments of direct image transmission by optical fibers are presented. At first, the images transmitted are characters. In this experiment a method for cross-talk reduction and image brightness increase is given. In the second experiment, the rainbow color drawback is overcome and quasi natural color image transmission is achieved.

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Cross-Talk Free Character Transmission

A 5x7 independent point matrix is often used for transmitting an alphabet. The method described below reduces cross-talk to a permissive level.

Set-up operation:

The set-up is shown in Figure 1. In this experiment, two different converters C_1 and C_2 are employed. The role of the converter C_1 is to achieve matching of a rectangular source to a linear array of 35 slots-source. At the input side of converter C_1, there is a fiber bundle which is arranged in an array of 35 parallel slots at the another end. Each slot consists of seven fibers, each fiber having a diameter of 1 mm. It is analogous to 35 slots-source. These slots must be separated from a diameter of the fiber core to avoid cross-talk between the neighboring points. On the receiver side, these seven fibers are arranged in a 3 mm diameter cross-section bundle as shown in the lower corner of Figure 1. These circular bundles are separated 1 mm apart; therefore the characters received at the output end are 19 mm x 27 mm (see Figure 2), which is large enough for direct and easy observation by the naked eye. M is a code mask placed in front of the converter C_1. Different codes representing different alphabets are chosen by M. These codes consist of covered and open slots as shown in Figure 1. The light power is spatially modulated and applied on the slots.

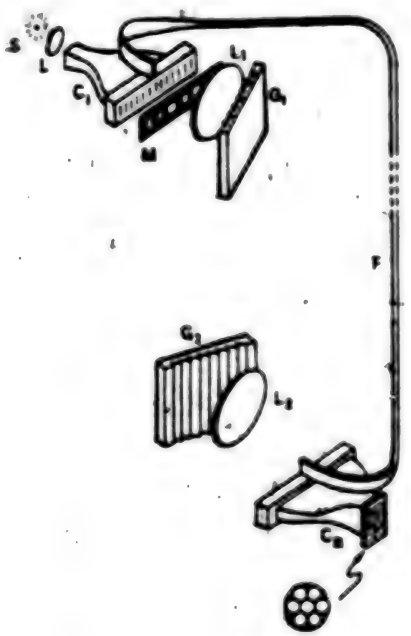

Figure 1. Experimental set-up for transmitting a 5x7 points image through a multimode fiber array by color coding. S: Source, a tungsten lamp. F: Transmission fiber array (7 fibers). M: Code mask. C_1: Converter on transmitter side. L_1, L_2: Lenses. G_1, G_2: Gratings. C_2: Converter on receiver side.

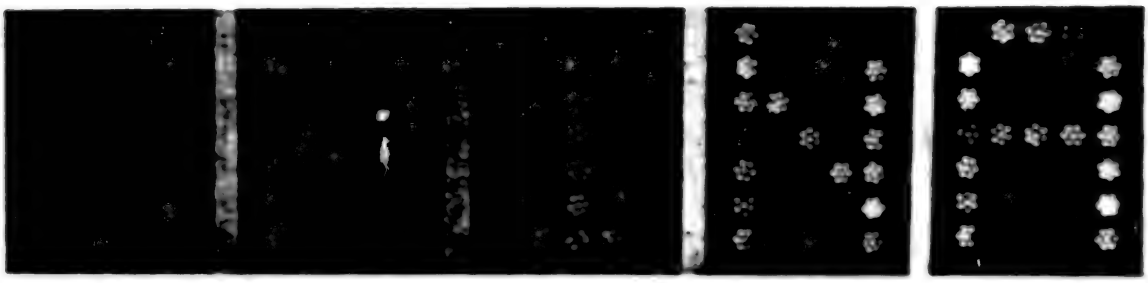

Figure 2. Experimental results for alphanumeric transmission. Each ideogram has been transmitted one at a time.

The light coming out from the slots and passing through lens 1 is dispersed by the grating G_1. The position of the grating G_1 is adjusted such that an "image spectrogram"[3] is displayed over the series of slots.

In order to transmit the image, the input end of the transmission fiber is placed at the center of this image spectrogram (see Figure 1). At the output end of this transmission fiber, there is another dispersive device L_2--G_2, identical to L_1--G_1. This device displays the coded spectrum on the input face of the converter C_2. This spectrum is then converted by C_2 into 5x7 points characters. Figure 2 shows some received characters at the end of converter C_2.

Cross-talk estimation:

A perfect spectroscope (dimensionless point source, perfect collimator) establishes a reciprocal correspondence between wavelength and abscissa in the focal plane of the collimator objective. In practice, the finite dimension of the source (here a fiber core) causes spectral elements to overlap and gives rise to some crosstalk between neighboring image elements transmission channels.

In the focal plane P of D, Figure 3, if an aberration free of the optical system is assumed, and the diffraction effects are neglected, with fiber having zero diameter, then in this system, there is a corresponding relation between abscissa X and wavelength λ. In actual fact, aberration exists and due to the finite diameter of the fiber, this relation is not so simple as it seems.

Let us suppose that fiber I radiates three different wavelengths given by $\lambda_I + \Delta\lambda$, λ_I and $\lambda_I - \Delta\lambda$, in Figure 3. $\Delta\lambda$ is chosen such that the three spots of light corresponding to the three wavelengths produced on the focal plane remain tangential to each other and that the change $\Delta\lambda$ corresponds to the diameter of the fiber 2R. Then the abscissa of the center of the spot X corresponds to λ only. But, at the two sides of X, this spot has the same wavelength λ at an interval of 2R. Let $S(\lambda)$ be the expression of this spectrum, where λ corresponds to the abscissa of the center of spot X. One put the transmission fiber on the X-axis, and the axis of fiber is agree to the center of the spot corresponding to wavelength λ_I, then lights whose wavelength are between $\lambda_I + \Delta\lambda$ to $\lambda_I + \Delta\lambda$ can penetrate through the

transmission fiber. A multimode fiber is used; hence the energy density is always constant in the end face of fiber.

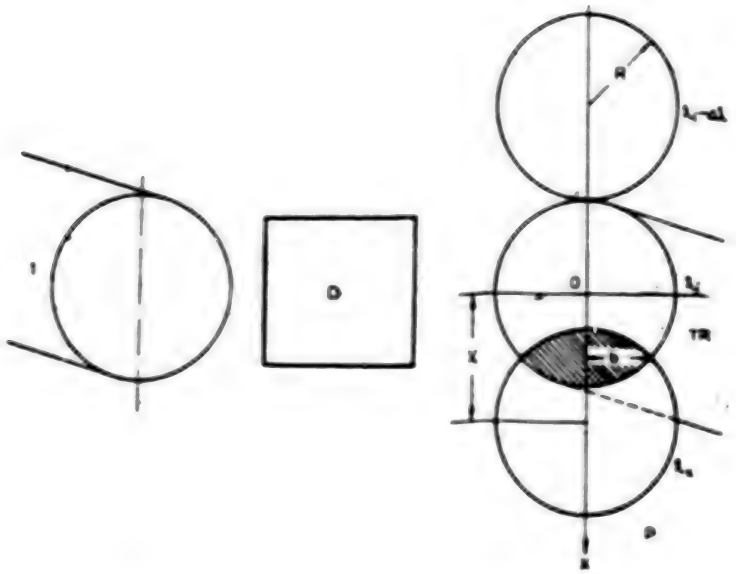

Figure 3. Cross-talk estimation.
D: Dispersive system I: Fiber corresponding to an image element
P: Focal plane Tr: Transmission fiber

The light power entering the transmission fiber is directly proportional to the shaded area (see Figure 3). Then we have

$$S(\lambda_0) = 2E\left(R^2 \operatorname{arctg}\frac{2b}{X} - \frac{Xb}{2}\right) \tag{1}$$

Where $$X = \frac{2R}{\Delta\lambda}\lambda$$

and $$b = \sqrt{R^2 - (X/2)^2}$$

E is a constant. The variation of S(X) as a function of X is plotted in Figure 4. S(X) is a spectrum function distributing continuously at focal plane with a width of 3D, and D = 2R. In this system, the process that signal passes through the received end is a process identical to that at the transmitted end. At the received end, the output spectrum is $S(X)\cdot S(X)$. The energy P_u which enters the main fiber (channel) is

$$P_u = K \int_{-1.8}^{1.8} S(X)\cdot S(X)\,dX$$

and P_c which enters the neighboring fiber is

$$P_c = K \int_{-1.8}^{1.8} S(X)\cdot S(L-X)\,dX$$

Where L is a distance between two channel. The cross-talk level is defined by:

$$M = 10\log\frac{P_s}{P_o} \qquad (2)$$

Formula (2) indicate if L = 4R, then cross-talk is free. However, in practice, cross-talk always exists due to the defects of the optical system.

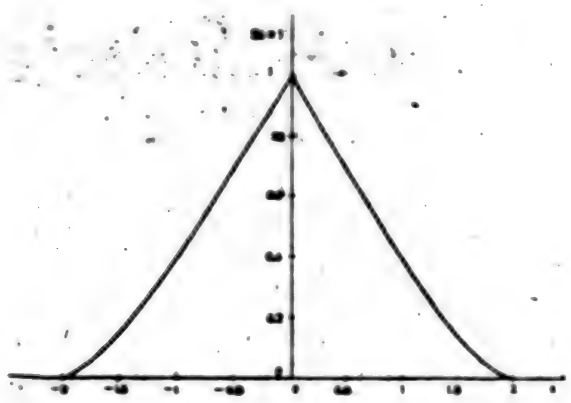

Figure 4. The variation of S(X) as a function of X.

A System for Transmitting Two-Dimensional Color Image

We propose a system with 20 transmission fibers to transmit 60 rows x 60 columns array image in color, i.e. in our system, the image array is divided into 20 strips. Every strip of the image is transmitted by a transmission fiber, and every strip consists of three rows of image, the first row is chosen to be red in color, the second and third rows to be green and blue respectively. Therefore, the received image is colored by layers of R, G, and B as in a television system. The resolution of this system is 20x60 for color image and is 60x60 for black-white image.

Set-up operation:

The set-up is shown in Figure 5. In this experiment, the transmitter and receiver form a reciprocal system. The image is projected with a slide projector on the input face of converter C_1. The light passes through C_1, traverses L_1, and is dispersed and reflected by grating G_1. It then enters the transmission fiber which is placed in the center of every row of the fiber. At the receiver end, the reciprocal process is achieved. The image can be seen at the end face of converter C_2.

To explain the function of the converter, let us consider a converter having one row as shown in Figure 6. Every row is divided into 3 subrows. Every subrow transmits a part of the spectrum, i.e. red, green and blue. At the other end of this row is arranged in linear and transmit a spectrum from red to blue. As a result, the image transmitted is colored in layers of R, G, and B as in a television system. In our actual experiment, the converter used has 20 rows, and every row consists of 180 fibers.

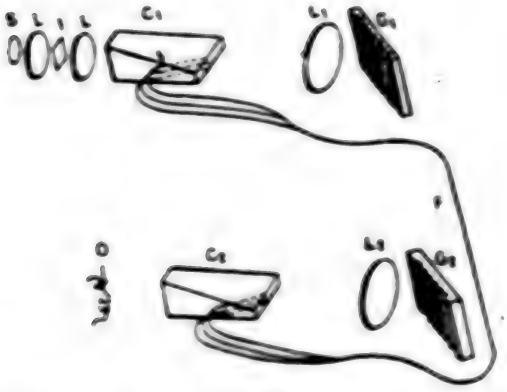

Figure 5. Experimental set-up for colored picture transmission. S: White source. I: Slide to be transmitted.

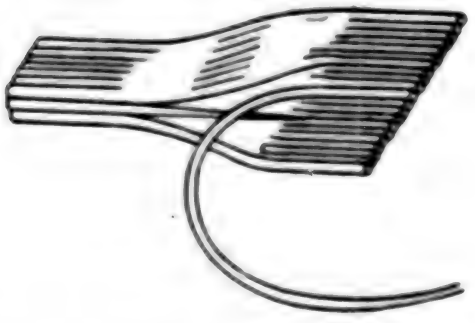

Figure 6. The structure of one row of the converter for colored picture transmission.

It must be noted, that the light coming out of the first row is reflected and dispersed by a dispersive system which displays a spectrum on the face of the last row, i.e. the information emitted by the first row will be transmitted by the fiber placed at the center of the last row. It is important that spacing of every layer at the converter must be precise.

Figure 7 is a photomontage showing the received image. Each character was transmitted one at a time. Owing to difficulties in the fiber bundle handicraft, the received image looks a little wavy.

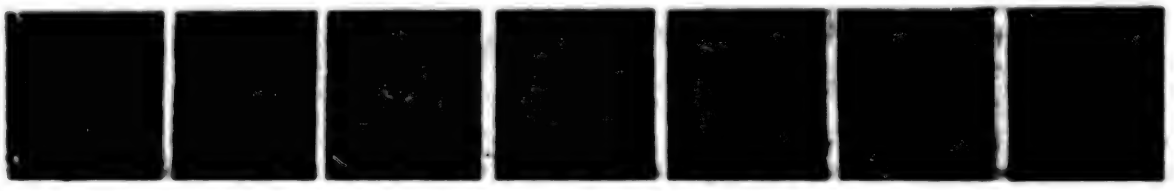

Figure 7. Experimental results for color picture transmission. The characters have been transmitted one at a time.

Conclusion

This technique is capable of distortionless bidimensional image transmission. The transmission rate can reach extremely high values. With today's low loss fibers, the image can be transmitted over kilometers without significant loss of intensity.

This technique is a passive optical system. Once the system is installed, it is very reliable and very simple to maintain.

These two experiments are useful too for frequency multiplexing and demultiplexing in the optical telecommunication systems. On the other hand, in the first experiment, the code mask can be replaced by liquid crystal window controlled by electronic circuit, then the characters can be changed rapidly. The second experiment has given a technique of transmission of a Chinese character by a few fiber bundles. If high technology can be improved, we can hope to obtain visiphone at a certain distance in the near future. For example, it can be used as a monitor for a robot in an automatized factory. Other advantage of this system is having perfect identical equipment at two ends of the system. Then, the transmission and receiver are dual function at two directions.

Acknowledgments:

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CSO: 5500/4141

PEOPLE'S REPUBLIC OF CHINA

METEOROLOGICAL SATELLITE DATA MORE WIDELY USED

OW031431 Beijing XINHUA Domestic Service in Chinese 0042 GMT 3 Feb 85

[Article by reporter Cui Lisha]

[Text] Beijing, 3 Feb (XINHUA)—Solely for use by the Meteorological Department in the past, the data from the meteorological satellite are now used for surveying oceanic resources, selecting sites for harbor construction, monitoring flood and waterlogging disasters, forecasting crop output, and many other fields related to the national economy.

China's Meteorological Department began using the data of the meteorological satellite through its own ground receiving station in the early 1970's to analyze and forecast weather, in particular, the typhoons and rainstorms. For more than 10 years, China has not missed any typhoon forecasting. In recent years, as the processing function of the ground receiving station has been expanding, the range of services of the meteorological satellite data has extended to many fields beyond the meteorological field. The vast potentials of such data are thus manifested.

This reporter has reviewed many satellite photos received and processed by the satellite meteorological center of the State Meteorological Bureau. In these photos, one can clearly discern cloud formation, warm and cold ocean currents, distribution of sea floes, spreading of river silt at estuaries, and growth condition of farm crops. It was learned that the meteorological center transmitted various information to departments concerned based on these photos.

Often, large schools of fish congregate where warm and cold ocean currents meet. In early January this year, the Shanghai Fishery Company received satellite photos of the warm and cold currents condition in the Tsushima fishing ground, provided by the satellite meteorological center. The company altered its course and in 2 days its fish catch accounted for 24 percent of the plan for the first 10 days of January. The fish catch the previous day accounted for only 0.74 percent of that plan.

A considerable part of Huanghe's silt drifts into the sea. Knowledge of the movement of the silt is of tremendous significance for harbor construction. In studying the feasibility of constructing the Dakouhe harbor in Huanghua County, Hebei, the Xiaoqinghe harbor in Shandong, and the Huaxia harbor of the Shengli oil field, the meteorological satellite photos on the movement of Huanghe's silt

into the sea, received and processed by the satellite meteorological center, provided invaluable information which dispelled worries about the silt's direct effect on harbor construction.

Now, the satellite meteorological center also relies on satellite photos to monitor the growth condition of farm crops to forecast their output; forecast the position and movement of sea floes to avoid their causing damage to facilities on the sea; and observe flood and waterlogging conditions to provide the state a basis on which to render rescue and relief services.

CSO: 5500/4190

PEOPLE'S REPUBLIC OF CHINA

QINGHAI HOLDS POSTAL, TELECOMMUNICATIONS MEETING

HK150658 Xining Qinghai Provincial Service in Mandarin 1100 GMT 14 Feb 85

[Text] Recently, a provincial work meeting on postal and telecommunications work stressed that we must smash the thinking of monopolization, raise capital through manifold levels and channels, and uphold the principle of developing state, collective, and individual undertakings simultaneously so as to expedite the province's development of postal and telecommunications understanding.

The meeting pointed out: The development of postal and telcommunications undertakings must conform to the local economic situation as well as the requirements of urban economic structural reform. We must mobilize industrial and mining enterprises to raise funds for running postal and telecommunications undertakings. We must also help factories and mines install telephone switchboards and, under the condition of standardizing technology, establish a communications network for special use. Concerning the delivery of mail and distribution of journals in the rural areas and among mines and enterprises in remote areas, we may contract them out to individuals, factories, and mines to undertake.

The meeting also urged the province's postal and telecommunications departments at various levels to tap their internal potentials and add vitality to the enterprises through such effective reform measures as contracting and the duty responsibility system. The meeting also urged them to improve the quality of service and strive to make postal and telecommunications work better serve the four modernizations.

CSO: 5500/4190

PEOPLE'S REPUBLIC OF CHINA

HUBEI CPC ORDERS RADIO, TELEVISION DEVELOPMENT

HK160643 Wuhan Hubei Provincial Service in Mandarin 1100 GMT 15 Feb 85

[Excerpts] The Standing Committee of the Hubei Provincial CPC Committee recently issued important instructions calling on the province to speed up the development of radio and television and strive to advance in the front ranks of the country. On 13 and 14 February, the provincial Radio and Television Department held a meeting of chiefs of prefectural and city radio and television bureaus and a number of county radio and television bureaus to convey and implement the spirit of these instructions.

A 26 January meeting of the Standing Committee of the provincial CPC Committee, held under the auspices of Comrade Guan Guangfu, heard a report from the party group of the provincial Radio and Television Department. The provincial leaders fully affirmed the achievements in the province's radio and television work in recent years, and especially since 1984. The Standing Committee pointed out: Radio and television represent the most powerful modern propaganda media. Radio and television must continue to regard propaganda as their central task, and the stress must be on improving the quality of propaganda and displaying local characteristics of Hubei. It must strive to serve the reform of the urban economic structure, the effort to achieve quadruplication, and the building of spiritual civilization.

To speed up the building of radio and television in Hubei, it is essential to solve the problem of coverage area as soon as possible. We must hurry to build those projects already decided on. The construction cycle must be shortened. The Guishan television tower, the color television center, and the four main microwave circuits are the backbone projects in developing the province's radio and television and must be built as quickly as possible. The quality must be first class.

In developing radio and television, it is necessary to have unified plans and graded responsibilities. We must bring into play the initiative of both provincial and local authorities. In the wake of economic development, the localities should assign some capital each year, according to their resources, to actively develop local radio and television.

Under the premise of ensuring a good job in propaganda work, the radio and television departments must open up more revenue sources to make up for lack of sufficient funds. It is necessary to further implement the policies on intellectuals and mobilize the enthusiasm of the staff and workers.

CSO: 5500/4190

BRIEFS

SATELLITE LAUNCHES FOR OTHERS--Li Xue, vice minister of the astronautics industry, indicated in London recently that China will compete with U.S. and other West European organs in using rockets to launch satellites for other countries. He said that China has not yet decided how much it will charge for launching satellites with rockets, or how to market the service, but is ready to talk to Western countries that have satellites to be launched. [Text] [Shanghai City Service in Mandarin 0100 GMT 17 Feb 85]

CSO: 5500/4190

DOMESTIC SATELLITE FIRM UNABLE TO PAY BILL

HK031008 Quezon City ANG PAHAYAGANG MALAYA 25 Apr 85 pp 1, 2

[By Ben Evardone]

[Text] A crony company which owed to Indonesian Government unpaid bills amounting to $2.4 million has been allegedly causing international embarrassment to the country, an opposition member of parliament revealed at the Batasan.

During Tuesday's Question Hour, MP Orlando Mercado (Opposition-Quezon City) alleged that the Domestic Satellite (Domsat) Company owned by Ambassador Roberto S. Benedicto, a crony of President Marcos, has not settled its obligations for the past 3 years to the Palapa Communications Facilities owned by the Indonesian Government which provides satellite services to several Southeast Asian nations, including the Philippines.

"This is an international embarrassement on our part," Mercado said.

Mercado also assailed the Bureau of National and Foreign Information (BNFI) and the PHILIPPINE NEWS AGENCY (PNA), news agencies of the government and subscribers of Domsat, which could not pay their obligations when they have regular budgets.

Information Minister Gregoria Cendana said he has already acted on the matter, and said that "we are capable of paying but for sometime."[Sentence as received]

Mercado also quoted Cesar Hechanova, Domsat's senior vice-president, as saying Domsat will pay its obligations "as soon as we have money."

The Philippines relies on Palapa for its long distance telephone calls and to beam television programs nationwide, Mercado said.

He also cited a report of the ASIAN WALL STREET JOURNAL, that President Marcos has authorized Domsat to have the exclusive franchise for domestic satellite transmission in the country and exempted the company from paying taxes.

Also during the Question Hour, Mercado assailed media monopoly of presidential cronies like Benedicto.

BRIEFS

NEW TV CHANNEL APPROVED--The cabinet approved a proposal for the Public Relations Department [PRD] to set up a television channel yesterday. A cabinet source said ministers took two hours to approve the proposal which will lead to the creation of a Channel 11. The channel will be operated by the PRD and will have access to the Mass Communications Organisation's Channel 9 broadcasting facilities. Channel 11 would broadcast through the Telephone Organisation of Thailand's microwave and the Communications Authority of Thailand's satellite system. Educational programmes will be the first priority followed by news, features and government programmes. Entertainment must not take more than 10 percent of viewing time. [Text] [Bangkok BANGKOK POST in English 16 Jan 85 p 1 BK]

MICROWAVE RELAY STATION--Public Relations Zone No 2 in Lampang Province will install a microwave link worth 2.2 million baht at a television relay station in Phitsanulok Province to relay news and important programs from Bangkok to people living in the areas of Phitsanulok, Uttaradit, Sukhothai, and Phetchabun Provinces. A contract to purchase the microwave link and equipment was signed this morning by the director of Public Relations Zone No 2 and representatives of a private company. [Summary] [Bangkok Domestic Service in Thai 0530 GMT 6 Apr 85 BK]

CSO: 5500/4329

INTER-AMERICAN AFFAIRS

IFRB ACCEPTS ANDEAN SATELLITE NOTIFICATION

Bogota EL TIEMPO in Spanish 31 Mar 85 p 6-D

/Text/ The International Frequency Registration Board, IFRB, accepted the joint notification of the Condor satellite system from the Andean countries, at the same time offering them the technical help they may require as of the date.

The satellite network should go into operation on 30 June 1990 and will serve as an element of integration of the nations of the area in the economic, political, cultural and social aspects.

A high-level commission, of which the vice minister of communications of Colombia, Maria Cristina de Mejia is a member, was recently in Geneve and succeeded in having the IFRB accept the notification and advanced publication of the project.

The Andean satellite system will consist of three satellites: Condor A, Condor B and Condor C, which will be located in the following geostationary orbits: 77.5 degrees W, 89.0 degrees W and 72 degrees W. Moreover, there will be three ground stations in the subregion.

The rural populations of difficult geographical access will particularly benefit from the Condor satellite; they will have telephone, telex and television reception services.

The system has been designed for attending to the communications needs of Bolivia, Ecuador, Peru, Colombia and Venezuela, projected into the next 15 years. Technically, the network will be characterized by the high radiated power limited to the five Andean Group countries. This peculiarity will allow the use of medium and small-sized ground stations for attending to communications in large cities and rural areas.

One of the advantages of the satellite is that as soon as it goes into operation two points can be quickly connected within the zone of cover without interruption of ground stations which are different than the two terminals. This is of interest of the Andean countries which wish to send educational health and development programs to remote regions with scattered population centers.

12951
CSO: 5200/2576

SPAIN STUDIES FEASIBILITY OF LATIN AMERICAN SATELLITE

Bogota EL SIGLO in Spanish 17 Apr 85 p 16

[Excerpts] An ambitious project is being arranged in Spain with a view toward the celebration of the Fifth Centennial of the Discovery of the New World; a project which, if carried out, will open the door to certain Latin American technological sectors.

Juan Majo Cruzate, general director of Electronics and Information Science for the Spanish Ministry of Industry and Commerce, has submitted to the commission for the celebration of the fifth centennial the idea of putting a Latin American satellite in orbit by that date.

The idea was so well received by the aforementioned commission, consisting of 12 representatives of science, letters and the Catholic Church that it has ordered the appropriation of 2 million pesetas for the purpose of preparing a draft report on the possibilities for success with the satellite, the cost and, particularly, the political and technical profitability that putting the aforementioned plan into effect would bring to the community of Latin American and Spanish peoples.

According to the promoters of the plan, this would be the first step toward the development of a program which could become a decisive move in the incipient progress of the Spanish space industry, and simultaneously a unique occasion for shaping for all time the Spanish contribution to Latin American technological development.

In the event that the majority of Latin American governments back the plan and could put it into effect, the satellite would be of a special type, not another communications satellite, as stated by Mr Majo, creator of the idea; because otherwise it would prove to be virtually impossible, owing to the existing international agreements.

Since the plan is still in the study phase, if technical solutions are found, the possibility has not been precluded of including the direct television satellite which Spanish Radio-Television [RTVE] currently has under study. The budget for the RTVE satellite alone amounts to 30 billion pesetas; hence an attempt has been made to procure the opinion of an official from the medium on the inclusion of its work in the plan devised by the Ministry of Industry. The response was that, for the present, they prefer not to make any statements on the subject. "We are not in the habit of making statements without having the data before us," was his comment on the matter.
2909
CSO: 5500/2070

CARIBBEAN SATELLITE PLANNED AT INAUGURATION OF CANTO

Port-of-Spain EXPRESS in English 26 Apr 85 p 31

[Text]

A CARIBBEAN satellite to provide both broadcasting and other telecommunication links and services between Caricom states and Caribbean Broadcasting Union member countries was one of the issues discussed at the recently concluded Caribbean Association of National Telecommunication Organisations (CANTO) inaugural conference at the Holiday Inn.

Last week's conference, which comprised delegates from throughout the region, was hosted by the Trinidad and Tobago Telephone Company (TELCO) which was elected as the first CANTO chairman at the conclusion of the conference. Among the several issues discussed aimed at improving telecommunications in the region were:

- inputs for the next 809 (the international telephone area code for the region) conference agenda scheduled to be held in Jamaica in October 1985;
- the proposal to establish CARISAT, the Caribbean Satellite; and
- the need for co-operation between operating telephone companies and external carriers.

The four-day conference also established a CANTO finance committee with the following objectives:

a. to plan and promote regional financial policies;

b. to explore the establishment of a skill resource bank; and

c. to establish a financial advisory team to consult with and assist telephone companies in smaller countries of the region with financing development programmes.

In addition to these resolutions, a draft constitution for the association was agreed upon in principle.

According to a release from TELCO, the first meeting of the CANTO board is scheduled for the near future while the second annual CANTO conference will be held in early 1986 when a secretariat will be established to co-ordinate all activities of the association.

CSO: 3298/595

BRIEFS

ANDEAN COMMUNICATIONS SATELLITE--Erland Barba, regional administrator of the National Telecommunications Enterprise (ENTEL) in Santa Cruz, has disclosed here that the subregional Andean Pact plans to launch its own communications satellite, "Condor" project, which is being promoted by the Andean Group, would be granted priority treatment. Right now studies regarding the launching of the "Condor" communications satellite are being carried out. [Excerpt] [PY111825 La Paz PRESENCIA in Spanish 30 Apr 85 p 5]

CSO: 5500/2076

GOVERNMENT ROLE IN ISLAND'S HIGH-TECH STATUS ASSESSED

Inaction on Proposals

Hamilton THE ROYAL GAZETTE in English 18 Mar 85 Computer '85 p 5

[Text] TIME is running out and Bermuda must move fast if it is to establish itself as an international hi-tech centre, warns Richard Murch, head of the Compter Society's advisory committee on software development.

And he says: "The window of opportunity is beginning to close" as other areas seek to grab a share of the lucrative hi-tech market.

The suggestion that Bermuda might become an international software and information centre was made seven years ago by the Island's resident computer guru, James Martin.

But though groundwork has been laid by the Computer Society nothing definite has as yet emerged from Government.

A Computer Society advisory committee was set up in February last year at the request of former Minister of Industry and Technology, the Hon John Stubbs.

And ten months ago, in May 1985, the committee came up with several recommendations. But they are still waiting for a reaction from Governement despite having asked a number of times, said Mr Murch.

The committee suggested that if Bermuda was to become a hi-tech centre Government must provide incentives for companies to come here. These recommendations call for:

- New legislation to protect software copyright and strengthen the secrecy laws.
- Loans and monetary incentives like deferrment of taxes on equipment and office space to encourage companies to settle here.
- Good high quality (and cheap) telecommunications.
- And Government must make a statement of policy.

Though Government has yet to respond to these suggestions other places like Florida, Massacusetts, Texas, California and North and South Carolina have geared up to attract hi-tech business.

Florida, for instance, has pumped in more money to its education programme in a bid to produce more engineers, scientists and step up computer education.

And it has set up a High Technology Industry Council and hi-tech businesses are being given tax exemptions.

Mr. Murch and his committee are also concerned at the small size of the Ministry of Industry and Technology. It has a staff of four.

And they suggested to Government last summer that a Hi-Tech Advisory Committee be set up to assist Government.

But Mr Murch says "We are waiting for a response on this."

Though Government has been slow to respond to suggestions of the committee, Mr. Murch says "It is fair to

say Government is committeed to the idea but we want to see clear precise action."

Though he admits it is not only up to Government but is also up to the private sector and entrepreneurs must identify the opportunities and seek out alternatives to tourism and insurance.

He points out that high technology is a multi-billion business and though the Island is not suitable for the manufacture of computer hardware there are opportunities for software development, sheltering of profits and computer insurance.

And in terms of putting his money where his mouth is, Mr. Murch has recently set up a company of whose own, Computer Development Corporation (CDC), whose aim is to encourage hi-tech companies to come Bermuda.

He says he has developed a strategy to attract hi-tech companies here. Though he says, this strategy is a trade secret.

And in addition to its consultancy and seminar business CDC is hoping to manage hi-tech companies. Mr. Murch expects companies to come to Bermuda for economic reasons, research and development and some tax advantages. □

Government's Position

Hamilton THE ROYAL GAZETTE in English 18 Mar 85 Computer '85 p 7

[Text] THOUGH Government is "supportive" of the fundamental idea for Bermuda to become a hi-tech centre there is a need for "imaginative entrepreneurs" to take advantage of the situation, says Senator the Hon. Gerald Simons, Minister of Community and Cultural Affairs with responsibility for Telecommunications.

And, he says, Government is currently debating its role in the future of telecommunications.

Government, he says is faced with the choice of either remaining quiet and behind the scenes or being in the forefront of telecommunciations with development in the hands of a Government-appointed Quango like the West End Development Corporation or the Housing Corporation.

Senator Simons only took over responsibility for Industry and Technology at the end of January and he says he and the Premier will be discussing Government's role.

The Minister has already met with members of the Computer Society anxious for the Island to become a hi-tech centre.

But the Minister maintains that many incentives for hi-tech companies to come to Bermuda are already in existence.

He points to the good communications and the pleasant environment that have already attracted many international companies and he says laws are already in place to allow customs duties to be deferred in certain instances.

And he says Government has shown its support to the Computer Fair by allowing equipment to come in duty-free and waiving work permits for persons participating in the Fair.

Replying to criticism that the Department of Industry and Tehnology is small — it has a staff of four. He says the Department's budget allows for $137,000 to be paid for consultants.

And the Minister claims the use of consultants allows the Department to keep abreast of changing technology.

Senator Simons says he is "Not a computer buff by any means" though he says he is "a user"

In his job as an insurance company manager he says he regularly uses information produced by computers and he has just installed a computer for inventory and accounting in the shop, the Harbour Master, owned by himself and his wife Mrs. Sheilagh Robertson.

And in his responsibility as Minister of Community and Cultural Affairs he is examining ways for the Library and Consumer Affairs Bureau to use computers to make information more accesible to the public.

And in his former post as Parliamentary Secretary for Education he was involved in the computers in schools project. □

CSO: 5540/031

BOLIVIA

ENTEL HIGH DEFICIT PRECLUDES EXPANSION PLANS

La Paz PRESENCIA in Spanish 9 Mar 85 p 6

/Text/ ENTEL has an annual budget of 3.193 billion Bolivian pesos for medical, dental and pharmaceutical expenses of its workers.

The National Telecommunications Enterprise (ENTEL) had a deficit of more than 100 billion pesos in its 1984 operations, according to information obtained by PRESENCIA.

Since 1977, when it became part of the microwave system, this company began to modernize its equipment so that manual communications systems were replaced by automatic systems. This modernization process was completed with the installation of earth station "Tiahuanaco" in 1979, a period in which the country's external communications acquired "independence," since up to that time they made use of stations in neighboring countries (especially Peru) to "bring down" international communications signals (telephone, telex and television).

These facts are contained in a report circulating in state institutions in the communications sector. Among these reports is also found the one referring to the 1984 deficit.

Former authorities of the General Telecommunications Directorate provided details on the deficit, figures that were updated to the first two months of this year. The figures show that ENTEL's deficit last year came to more than 100 billion Bolivian pesos. This deficit may have placed ENTEL in an extremely difficult situation which may even endanger its future development, to say nothing of the salary requirements of its workers.

Salary Structure

Neither ENTEL nor the Ministry of Transport and Communications would provide details on the structure of employees' wages, despite insistent questions from the press, but responsible sources indicated that the minimum monthly salary for a worker in that company is 20 million pesos.

Basic income, excluding work category, length of service, premiums or year-end bonuses, comes to 11.22 million pesos. To this wage scale should be added the bonuses for vacations, productivity, traveling expenses and food, so that each worker makes 20 million pesos. The food bonus is 7.5 million pesos and the productivity bonus 5 million pesos.

The productivity bonus granted by ENTEL is a payment equivalent to a three-minute high-tariff telephone call. A foreign telephone call costs 1.7 million pesos per minute.

ENTEL workers are members of the CNSS medical and social insurance plan. Besides this insurance coverage, ENTEL workers have an annual company budget item of 3.193 billion pesos, broken down as follows: 1.323 billion pesos for medical, dental and pharmaceutical services and 1.870 billion pesos for medicines and clinical and chemical analyses. This budget is met entirely by ENTEL, without any contributions from its workers.

12856
CSO: 5500/2061

REPORTAGE ON USSR INTEREST IN MICROCOMPUTER PURCHASES

USSR Interest in Microcomputers

Brasilia CORREIO BRAZILIENSE in Portuguese 13 Apr 85 p 14

[Article by Gladston Holanda]

[Text] The USSR wants to buy 70,000 microcomputers manufactured by Brazilian industry and has already sent correspondence to that effect to Itamarati [Brazilian Ministry of Foreign Affairs], according to a statement yesterday by a highly placed source in the SEI (Special Secretariat of Informatics). The main reason for the Soviet interest is related to the highly competitive price of Brazilian equipment in terms of the external market.

Leaders in ABICOMP (Brazilian Association of the Computer and Peripherals Industry) were informed of the Soviet proposal by the SEI and are in contact with their membership to determine how the industry could meet the proposed request from the Soviets. If the transaction materializes, it will unquestionably be the biggest deal ever for the national computer industry. To get an idea of the volume involved in the Soviet proposal, one need only recall that the number of microcomputers installed in the country in 1984, according to an estimate by the PROLOGICA firm, was 87,000, with billing of 107.8 billion cruzeiros. The same firm anticipates that the number will reach 200,000 pieces of equipment.

The Soviet interest in microcomputers is geared mainly to the area of education, and ASSESPRO (an association representing the interests of the software community) is also preparing to penetrate the Soviet market through sales of its systems.

Despite our attempts, we were unable yesterday to confirm the report concerning the Soviet interest in Brazilian microcomputers with Itamarati's Commission on Trade with East Europe, the reason being that the head of the commission spent the afternoon in meetings. To avoid hurting anyone's feelings at Itamarati, the source from which we obtained our information preferred to remain anonymous.

Robotics

The commission that spent 3 days analyzing plans for the production of robots in Brazil concluded its preliminary work yesterday after listening to the 22

interested companies present a detailed explanation of their plans in that area.

Umberto Gobbatto, head of the SEI's Department of Industrial Automation, confirmed yesterday that the plans to develop independent technology have a good chance of being approved. He said the plans were excellent from the technical standpoint. Concerning 10 other firms that had submitted plans for buying technology abroad, Gobbato said more thorough analysis was needed to ensure that their plans would not interfere with production by firms wanting to develop their own technology. In other words, a "semireserved market" for the industrialization of robots in Brazil will have to be established, with special treatment being accorded those domestic firms that promise to develop their own technology.

The SEI is also concerned about the development of new technologies for the future production of robots. One of the standards that will be adopted by the commission, which is made up of representatives of the government, universities, and professional associations, concerns the legal makeup of the firm: the venture in question, the funds to be allocated to it, the available technical team, and the program for local content and development.

Legislative Bill

Under a bill presented to the National Congress by Senator Nelson Carneiro (PTB [Brazilian Labor Party], Rio de Janeiro), an article would be added to the CLT (Consolidated Labor Laws) specifying the weight to be assigned to imported robots in the composition of the work force and classifying them as "foreign workers." The bill by the senator from Rio de Janeiro states that "for the purposes of proportionality as dealt with in the article, robots imported to perform labor in industry are considered to be groups of foreign workers, and the weight assigned to them will correspond to that of the manpower which they effectively replace."

USSR Wants Microcomputers

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 19 Apr 85 p 22

[Text] Brasilia--The Soviet Union is interested in acquiring 70,000 microcomputers on the international market for use in its program for computerizing secondary education, according to an announcement yesterday by the Soviet ambassador to Brazil, Wladimir Schenchev, following a 30-minute talk with the minister of science and technology, Renato Archer. But Soviet interest in Brazilian microcomputers "is only a rumor," said Schenchev.

Believing that they can win in international competition, Brazilian industrialists have given up hope of receiving more information concerning the deal from the government and have decided to make direct contact with the USSR's Department of Trade in Moscow, according to Comdr Antonio Didier, deputy chairman of ABICOMP.

Late yesterday afternoon, ABICOMP began distributing to microcomputer firms a communication from the SEI announcing the Soviet interest in Brazilian equipment. The communique from the SEI does not provide any further details--after all, explained one of the SEI's advisers, the Brazilian Government itself does not know any more than that.

At the end of March, the Soviet chancellery informed the Brazilian Embassy in Moscow concerning the purchase of microcomputers. The information was sent on to Itamarati's Trade Department in Brasilia, which relayed it to the SEI 2 weeks ago. Businessmen and government officials were hoping that the ministry would be enlightened yesterday as a result of the visit to Minister Renato Archer by Ambassador Schenchev. But Archer confided to his advisers later that in the course of their very formal 30-minute talk, Schenchev had spoken only "in general" about bilateral cooperation in the field of technology. According to Antonio Didier, Brazil is currently capable of placing microcomputers with eight bits (sufficient for educational purposes) on the market at a price of $65. That is similar to the price of microcomputers produced in Hong Kong.

11798
CSO: 5500/2068

BRAZIL

NEW SEI HEAD NOTES INTENT TO IMPLEMENT INFORMATICS POLICY

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 20 Mar 85 p 26

[Text] Brasilia--The new head of the Special Secretariat of Informatics [SEI], Jose Doria Porto, took office yesterday, and today it is the turn of the new chairman of the Funding Authority for Studies and Projects (FINEP), Fabio Celso Guimaraes, who will be sworn in at a ceremony in Rio de Janeiro. During his installation, Doria said that "the war will continue, and so will the policy," and he predicted that although the Ministry of Science and Technology, which he described as the ministry of the "future," will face a number of difficulties, it intends to assign priority to implementing the provisions of the law on informatics.

At a press conference, Doria Porto commented that with respect to the question of establishing firms in that sector in the area covered by SUFRAMA (Superintendency of the Manaus Free Trade Zone), he intends to see that the law on informatics is enforced. In other words, he will not permit other regions to be harmed. Concerning COBRA [Brazilian Computers and Systems, Inc.], a company in which the state is a big stockholder, Doria said he would like to see an important strategic role assigned to that firm.

CONIN

Doria Porto said that the National Council on Informatics (CONIN) would have to meet in April to ensure sufficient time for submitting the national plan on informatics to the National Congress by October, as required by law.

Software

The new secretary says that establishing priorities for the industry is still very difficult but that now is the ideal time for Brazil to invest resolutely in software. He explains that since we have not invested in that area in the past, the country does not need to protect any established interests and can enter directly into the new technologies that will make high productivity and quality possible.

FINEP

The new chairman of FINEP, Fabio Guimaraes, announced that the institution needs an additional allocation of between 140 billion and 150 billion cruzeiros if it

is to continue all its research agreements with the country's universities and other institutions. He explained that of the 190 billion cruzeiros included in FINEP's budget, 180 billion are already committed and that a good number of the agreements, which cannot be interrupted, will expire beginning in July.

Archer

Commenting on the disagreement between the SEI and SUFRAMA, Minister of Science and Technology Renato Archer said yesterday in Brasilia that "the law on informatics was designed for the entire country, and we cannot allow that instrument to exclude one area of Brazil in favor of another." Archer insisted that reducing production costs by about 35 percent for firms setting up operations in the Manaus Free Trade Zone would place industrial plant in the country's Center-South Region at a disadvantage.

11798
CSO: 5500/2068

BRIEFS

ARCHER ON RESERVE POLICY--Brasilia--Minister of Science and Technology Renato Archer yesterday advocated retention of the reserved market for the microcomputer industry as a way of strengthening national industry and freeing it from competition with multinational firms, which offer more advanced technology. He feels that the legislation on informatics as approved by the previous administration must be retained, but that some of the vetoes imposed by Figueiredo when signing the bill passed by Congress need to be revised. This includes access by everyone to government data banks: "It provides the citizen with the opportunity to confirm or defend himself against the information stored in government computers." With a view to revising the vetoes applied to the draft law on informatics, the minister said he had already been visited by Senator Virgilio Tavora (PDS [Social Democratic Party], Ceara), who is prepared to submit a substitute bill incorporating some of the vetoes. The minister said: "I am not yet familiar with the senator's bill, but I feel that we need to promote a new discussion of that legislation in the National Congress." [Text] [Sao Paulo O ESTADO DE SAO PAULO in Portuguese 18 Apr 85 p 31] 11798

CSO: 5500/2068

NATIONAL DATA TRANSMISSION NETWORK UNDER STUDY

Bogota EL ESPECTADOR in Spanish 14 Apr 85 p 8-A

[Text] The government, jointly with TELECOM [National Enterprise for Telecommunications], the country's telephone companies and representatives of the users, will soon analyze the technical features that the National Data Transmission System, which is due to be subjected to bidding shortly, will offer in its experimentation phase.

The users of this service, primarily financial institutions, expressed their concern over the technological change that the transfer of its systems to the new network will entail.

At a social gathering organized by EL ESPECTADOR, the representative of the Ministry of Communications, Adolfo Vargas, and the manager of the Bogota Telephone Company [ETB], Carlos Eduardo Ballen, explained the general features of the experimentation phase to be carried out with the cooperation of the Spanish firm IBI.

The Spanish company gave the Colombian Government an experimental system worth nearly $500,000, which will go into operation this June, while at the same time offering training courses for six engineers who are currently in Barcelona.

The manager of ETB remarked that, on the national level, the University of the Andes is intensifying its information science and data teleprocessing courses, in order to better train our technicians.

Financing

As for the financing of the new system, Alvaro Nino, representative of the National Planning Department, disclosed that the government has given priority to the project and has arranged several lines of credit for its execution.

Based on the initial agreement, TELECOM will purchase the equipment for the purpose of selling it to the telephone companies, thereby unifying the system, which will have a single supplier and a centralized administration, through regional offices which will be interconnected to the main management center.

This will not entail the dismantling of the isolated pairs which are currently being leased by private entities, and the transfer to the National Data Transmission System will only take place when the clients are economically capable of doing so.

According to the Ministry of Communications, the new system will cut costs and users will have an opportunity to witness the benefits stemming from the transfer thereof.

The ETB declared that, in the concrete instance of the nation's capital, several proposals for expansion in the interconnection area are being analyzed, in order to give the network a multiplicity of uses apart from telephonic use.

Objections to IBI

Nevertheless, the IBM representative, Alvaro Torres, commented: "There is no need to experiment with a system that has been tested sufficiently in various parts of the world, while it is becoming more essential to first identify the type of system that the country is going to have."

Also, the firms planning to participate in the forthcoming bidding on the national system projects voiced fear that IBI might be given some advantage as a result of the donation of equipment to the government.

They commented: "It is difficult to imagine that all the assistance provided by the Spanish firm does not call for some compensation which might lie in the area of data processing outside the country."

In view of these concerns, the manager of the ETB claimed that the system provided by IBI is relatively small and that, once the experimental phase has ended, it could be used for preeminently private work, for example, an exclusive system for the government.

Equal Terms

The official maintained that IBI will participate on equal terms with the other firms in the bidding competition, and that if its plan is not the most feasible, steps will be taken to disqualify it.

On the other hand, the tests that are being conducted in Cali with Spanish equipment "have not brought the anticipated results, because preparation is lacking and the technicians have not been updated," according to the representatives of Carvajal, Inc, of that city, Marco Tulio Sanchez and Juan Fernando Bonilla.

Other users of the data transmission system noted that, in the administrative realm, there is a division between the telephone companies and TELECOM, so that when "technical flaws occur, particularly in the isolated pairs, one doesn't know whom to contact."

The Complaints

The CONAVI [National Council on Housing] representative, Juan Manuel Acevedo, expressed the view that a single entity should be created to deal with the clients' complaints and assume the pertinent responsibility; because, in any event, the service bills must be paid in their entirety, hence, the system has been inactive for several days.

He added that, before making decisions on the most viable system for the country, a review should be made of the client's main requirements, with the parties assuming a written commitment in advance, clearly stipulating that the transfer to the new system will not be made in a compulsory manner.

According to the proposals set forth by the users and manufacturers, the representative from the Communications Ministry, Adolfo Vargas, announced a meeting of a primarily technical nature in the next few days, at which a study will be made of the IBI experimental phase and further features of what the National Data Transmission System will be like are to be announced.

2909
CSO: 5500/2070

COLOMBIA

ADVISORY COMMISSION FOR TV REGULATORY BILL NAMED

Bogota EL SIGLO in Spanish 17 Apr 85 pp 1, 2

[Text] An advisory commission to be responsible for preparing the regulatory bill of Law 42 of 1985 (Television Statute) was appointed today by the communications minister, Nohemi Sanin Posada.

Law 42 converted INRAVISION [National Institute of Radio and Television] into a special type associative entity and, thanks to this initiative, the control of Colombian television was transferred to the state's jurisdiction, not that of the government, as had been stipulated.

The advisory commission will be installed at 1600 hours this Wednesday, in the Ministry of Communications, by the head of that ministry, Nohemi Sanin Posada.

The agency will be comprised as follows: the communications minister or her representative; the director of INRAVISION; Senator Jose Guillermo Castro; Representative Luis Alfredo Ramos; Representative Rafael Francisco Amador Campos; former INRAVISION director Gustavo Castro Caycedo; former INRAVISION director Mario Madrid Malo; attorney Luis Ignacio Betancur Escobar; former INRAVISION director and television professional Fernando Calero; the communications expert Jorge Villegas; the chief of the Ministry of Communications legal division, Orlando Gallo Suarez; and the chief of the INRAVISION legal office, Patricia Pardo.

The commission will have a period of 2 months reckoned from the date of issue of this resolution (8 April 1985) to submit the results of its activity.

In its new phase, INRAVISION will be directed by a national television council, which will be required to perform functions such as the formulation of the entity's general policy, the awarding of television space, the establishment of modes and percentages of programming based on the categories thereof, overseeing the quality of the television service, approval of the rate system submitted for its consideration by the administrative board, regulation of the use of television space by the candidates for the presidency of the republic, appointment of the administrative board and approval of its regulations, and approval of the entity's budget, among other activities.

The advisory commission which will be responsible for preparing the regulations of Law 42 was appointed by virtue of Resolution No 2010 of 8 April 1985, which bears the signatures of the communications minister, Nohemi Sanin Posada, and the entity's general secretary, Diana Patricia Salom de Cadavid.

2909
CSO: 5500/2070

ECUADOR

GOVERNMENT CANCELS TELEVISION LEASE CONTRACT

PA091639 Hamburg DPA in Spanish 0027 GMT 9 May 85

[Text] Quito, 8 May (DPA)--The Ecuadoran Government, through the Institute of Telecommunications, decided today to cancel the lease contract on a frequency for a new television channel, which was already in the testing phase.

According to the official report, the canellation was ordered because the leaseholder "did not install the equipment in the specified place or within the stipulated period of time."

The frequency, which corresponds to Quito Television Channel 5, immediately reverted to the state.

The leaseholder, known as ORTEL, was formed by a group of independent newsmen, who after fulfilling the legal requirements, received authorization from the authorities last August to install the new channel.

However, the current Ecuadoran Government headed by Leon Febres Cordero has always been opposed to the new channel for reasons generally considered political.

The opposition has repeatedly charged the government with violating freedom of expression through pressure on the communications and journalistic media and closing of radio stations.

After the contract was canceled, the ORTEL board of directors denied having failed to fulfill the provisions and said that all the specifications were well within the legal bounds.

Two weeks ago when Channel Five began its test transmissions, military forces on government instructions prevented the continuation of its tests. This measure was later lifted. Today, however, the concession of the frequency was canceled.

CSO: 5500/2074

URUGUAY

1981-85 TELECOMMUNICATIONS OBJECTIVES, GOALS DETAILED

Madrid AHCIET in Spanish No 10, 1985 pp 26-39

[Paper by Hugo Raffo Tobler of ANTEL, Uruguay]

[Text] One of AHCIET's new members, which joined the association during its third General Assembly, is ANTEL [National Telecommunications Administration] of Uruguay.

To give our readers a good idea of the current status and prospects of telecommunications in Uruguay, we are publishing this paper presented by Hugo Raffo Tobler at AHCIET's meeting of network planning specialists, held in Madrid in December 1984.

I ANTEL's Future Evaluation Plans

A) Urban Telephone Systems

1) Montevideo

Montevideo's telephone system serves not only the department of the same name, but also the area lying between the Carrasco Arroyo and Roosevelt Park (Barra Carrasco and Paso Carrasco).

It has 21 telephone exchanges currently serving 190,897 customers and about 49,800 pending requests for service, with an installed capacity of 215,240 numbers.

During 1983 the Montevideo customers made over 496 million local calls; 13.9 million long-distance calls within Uruguay; and 2.1 million calls to other countries.

The age of the equipment in the Montevideo exchanges is as follows:

Under 10 years: 47.0 percent
Over 10 and under 25 years: 9.0 percent
Over 25 and under 40 years: 31.0 percent
Over 40 years: 13.0 percent

Equipment that is between 25 and 40 years old requires very special attention. That is why many companies are now in the process of replacing it. In our case, though, given the high cost in foreign currency this would require, our policy is to maintain this equipment, even though this means that operating costs are higher.

Beyond the age of 40 years, there is no other course but to take it out of service, a process that ANTEL should complete soon.

As for the cable and line systems, contracts have already been awarded for cables and to replace 100 percent of the tertiary lines and 80 percent of the primary lines. The remaining 20 percent of the lines are in good condition and do not have to be replaced. In addition, replacement of all the customers' cables that have reached the limit of their usable lifespan is now in progress.

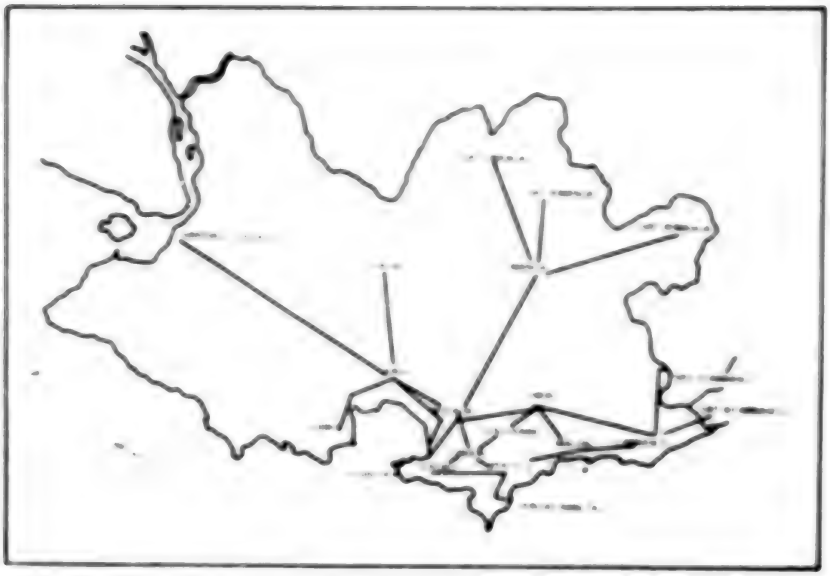
The primary cables and trunk lines are being pressurized; the percentages of pressurized cables per exchange are given below:

Centro	88 %	Trunk Lines
Cordon	85 %	100 %
Union	75 %	
Paso	78 %	
Pocitos	75 %	
Aguada	78 %	
Carrasco	75 %	
Malvin	70 %	
Punta Carretas	65 %	
Centenario	30 %	
Manga	10 %	

2) Interior

In 1978, automation was completed in all the provincial capitals in the interior. At that time this service already existed at the following exchanges: Punta del Este, Peninsula de Punta del Este, La Barra de Maldonado, Las Piedras, La Paz, Atlantida, Parque del Plata, Salinas, and in some other areas with a limited capacity to serve customers. By the end of 1983 this service was also available in Portezuelo, San Carlos, Piriapolis, San Jose de Carrasco, Solymar, El Pinar, Rosario, Pando, and Nueva Helvecia. Thus, a total of 52,421 users then had automatic local service. In some of these exchanges such automated service is still not available. For that reason, further expansions are needed.

Even at the automatic exchanges themselves, there are rural customers who must still use manual service because of the length of their lines. These, combined with customers at another 295 central offices which are semi-automated or manual exchanges, amount to a total of 15,612 customers who do not have automatic telephone service.



Map showing Montevideo's trunk line system.

For the latter exchanges, various types of improvements must be provided, ranging from a simple expansion of the operating boards to the automation of service, and including a total renovation or replacement of the networks. In some cases, new focal points will be established where there is now no service, or where it is extremely limited and uncertain in nature.

During 1983, 94.2 million local calls, 24.5 million long-distance calls, and 1 million international calls originated in the interior of Uruguay.

B) Long-Distance Telephone Service

1) National Traffic

a) Connections

At the end of 1983 there were four microwave systems in operation:

System I: Montevideo-Colonia-Salto Colonia-Buenos Aires. With service t elones, San Jose, Rosario, Nueva Helvecia, Carmelo, Dolores, P s, Pray Bentos, Paysandu, and Salto.

System II: Montevideo-Rivera-Artigas. With service to: Florida, Durazno, Trinidad, Paso de los Toros, Tacuarembo, Rivera, and Artigas. Systems I and II were connected upon the completion of the Artigas-Gomensoro-Bella Union-Constitucion-Salto loop.

System III: Montevideo-Melo. With service to: Atlantida, Pando, Minas, Treinta y Tres, and Melo.

System IV: Montevideo-Chuy. With service to: Piriapolis, Maldonado, San Carlos, Rocha, Chafalote, La Paloma, Castillos, Santa Teresa, and Chuy.

Completion of the installation of an additional radio channel for single-direction broadcasting of television programs in systems I, II, III, and IV.

The installation work for the Aguada-Manga support link for the Standard A Ground Station now under construction has begun.

Installation of the Aguada-Carrasco Airport link. Outfitting of new low-capacity radio links with both VHF and UHF.

Of the 5,500 links used in Uruguay, over 84 percent are operated by microwave. Only 10 percent of these links are conventional links using bare copper wire. The remaining communications use both VHF and UHF radio equipment and carrier wave, or cable systems, as in the case of the connection between Montevideo and Las Piedras. There are also telephone cable links using multiplex equipment with PCM [Pulse Code Modulation] between Las Piedras-Aguada (Montevideo), San Jose de Carrasco-Aguada (Montevideo), Manga-Aguada (Montevideo), Paso-Santiago Vazquez (Montevideo), Carrasco-Aguada (Montevideo), Maldonado-Barra de Maldonado, and Maldonado-Portezuelo.

b) Communications

From the information provided in Section A, we can see that 38.3 million long-distance telephone calls were made during 1983.

By the end of 1983, 70 percent of the national long-distance calls were made by direct dialing.

2) International Traffic

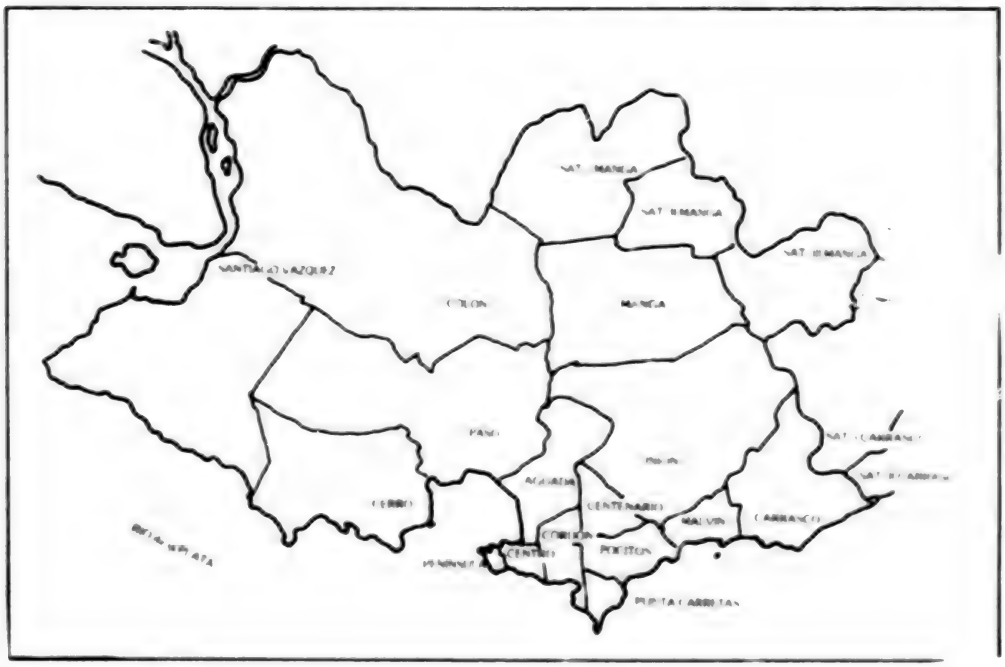
a) Types of Connections

We should make a distinction between various types of connections or links.

Border areas. These are communications established between towns near different countries (Rivera-Livramento, Salto-Concordia, Paysandu-Concepcion, Colonia-Burnos Aires, Artigas--Cuarai, Rio Branco-Yaguaron, etc.). Service is provided either by telephone cables, by above-ground lines, o by radio links. There are about 85 of these. The first listed and Colonia-Buenos Aires are automated in both directions.

With neighboring countries. Service with Argentina is handled by microwave and via the Montevideo-Colonia-Buenos Aires route. Of the 360 telephone channels available, about 260 are used for international direct dialing service, and 39 are international lines going beyond Argentina. In addition,

25 are used for manual lines, and others are used for telex service, leased lines, etc.



Montevideo Area Telephone Exchanges

The connection with Brazil is handled by microwave, via the Montevideo-Rivera route. A total of 38 circuits are available for telephone service.

With other countries. Until the end of 1980 the majority of the traffic was routed by satellite circuits in Terrena de Balcarce in Argentina. At the beginning of December 1980, when the Standard B Ground Station at Manga (Montevideo) was put in service, more circuits were made available, providing additional service to the United States, Canada, Spain, Italy, and Switzerland, and service was at that time established to the United Kingdom, France, and the Federal Republic of Germany. By the end of 1983, there were a total of 95 circuits available for telephone service and nine for other uses, serving Canada, Chile, Spain, the United States, France, England, Italy, Paraçuay, the Federal Republic of Germany, Switzerland, and Venezuela.

b) Communications

Direct dialing service between Argentina and Uruguay, first made available in 1979, declined by 5 percent in relation to the previous year. This service also showed a slight decrease in relation to other countries.

c) Telex

The presently existing telex system uses manual switching, electromechanical, and electronic switching central exchanges. For national and international service, this system uses time-sharing telegraphic multiplex equipment, which can handle 46 telegraph channels in one telephone channel. In addition, the older harmonic telegraph equipment (24 telegraph channels for each telephone channel) is used in secondary areas of the national network.

To summarize, then, at present Uruguay has:

1. one semiautomatic central exchange with 390 numbers in Montevideo;

2. one local, long-distance, and international electronic automatic central exchange in Montevideo, with a total capacity of 607 numbers and 144 international links;

3. one manual exchange with 10 numbers in Colonia;

4. one manual exchange with 60 numbers in Paysandu;

5. one manual exchange with 120 numbers in Punta del Este.

These exchanges have a total of 133 customers. There is a total of 1,430 customers.

Montevideo's electronic and electromechanical exchanges are now saturated because of a shortage of international links. An attempt has been made to eliminate the semiautomatic exchange since it does not meet international quality standards.

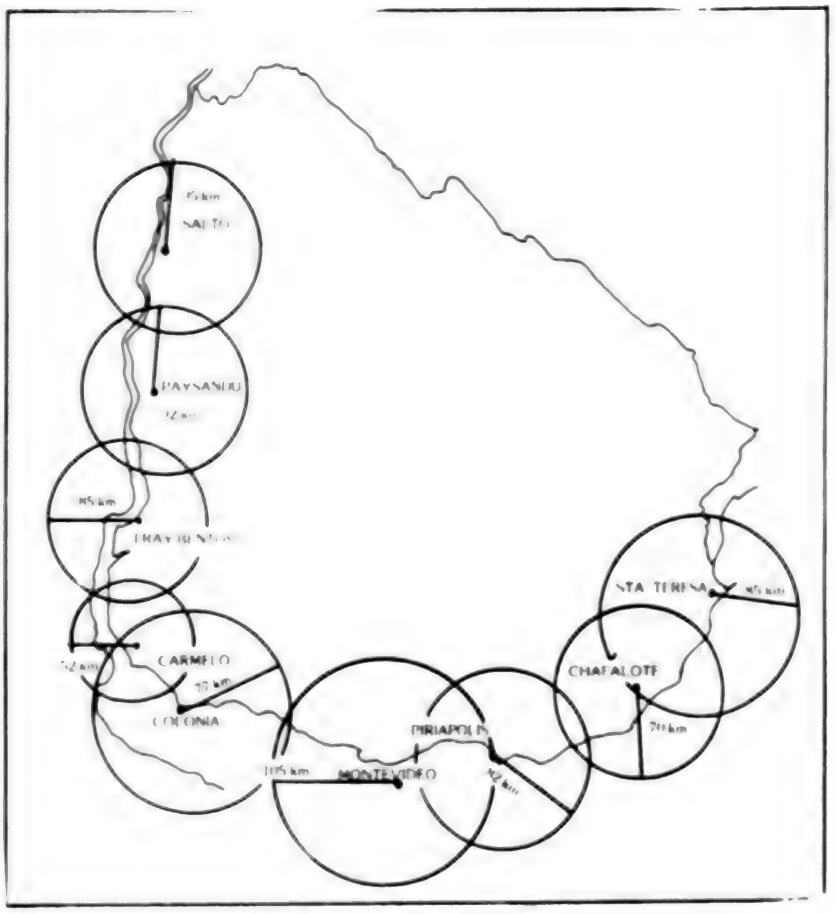
This congestion in service made it essential to take steps quickly in order to meet the demand, both in terms of the number of users, and the quantity of traffic, by planning for the expansion of this electronic exchange, both in numbers and in links.

d) Other Services

1) Telegraph Service

National traffic, which essentially stagnated until 1976, had growth rates of 11 percent, 2 percent, 5 percent and -17 percent for 1980, 1981, 1982, and 1983, respectively. This is automatic service, and most of the telegraph offices use the electromechanical telex exchange. For international traffic, there was a very large upturn when ANTEL took over all the facilities of the foreign telegraph companies: 5 percent in 1980, 23 percent in 1981, -30 percent in 1982, and -33 percent in 1983.

Although operations have been greatly improved, there are still some agencies and branches that do poor work, and do not handle their distribution services well.



VHF Offshore Service

2) Offshore Telephone and Telegraph Service

ANTEL provides this service to ships. Significant improvements have been introduced in recent years, leading to an expansion in radiotelephone communications of 34 percent in 1979 and 12 percent in 1980. In 1981 there was a 26 percent decline, an 8 percent decline in 1982, and in 1983, a 5 percent upturn.

In addition, radiotelegrams, weather forecasts and warnings for navigators are broadcast; medical consultations are available, and radioconversations can be established for emergencies, including requests for assistance, maritime accidents, etc. Local, long-distance, and international telephone communications are handled with ships engaged in both river and maritime navigation.

In 1983 a new offshore communications system was set up, consisting of a VHF subsystem with nine stations located in Salto, Paysandu, Fray Bentos, Carmelo, Colonia, Montevideo, Piriapolis, Chafalote, and Santa Teresa, controled from the operations center in Montevideo, Punta Carretas. There is an MF and HF subsystem for medium and long distances providing both telephone and telegraph service; the receiving station is located in Punta Carretas, and the HF and MF transmitting station is in Santiago Vazquez.

Capacity of Telephone Exchanges

	on 31 Dec 81	on 31 Dec 80	on 21 Dec 79	Increase 81-80	Increase 80-79
Montevideo	194,960	186,260	173,240	8,700	13,020
Interior	71,831	66,248	64,661	5,583	1,587
Total	266,791	252,508	237,901	14,283	14,607

II ANTEL's Objectives and Goals for the 1981-1985 5-Year Period

Based on the present service situation described in Part I, ANTEL's objectives and goals, along with their respective indicators, are as follows:

A) Objectives

1) To meet telecommunications requirements for local, national, and international long-distance service, in harmony with the development of other sectors of the nation.

This objective is designed to encompass the normal growth in demand in all sectors, by means of projects which will expand or complement the current facilities. Any substantial change in the type of service or any extraordinary work to restore the efficiency of service are covered by the following objective.

2) To improve the quality of service by replacing equipment and telephone networks that have been in use for a long time. This second objective includes projects necessary to replace central exchange and network equipment that is in poor condition, to modernize telex and offshore facilities, to give the nation the international connections it needs, etc.

B) Goals

In order to achieve the general objectives listed, ANTEL proposes to meet the following goals, as interpreted by appropriate indicators.

1) Attention to telephone demand

The worldwide indicator used is telephone density; that is, the number of telephones for each 100 inhabitants.

In December 1983. Uruguay had 336,609 telephones (including main lines, extensions, phone booths, coin-operated phones etc.) Therefore, its density was 11.2 phones per [100] inhabitants; to meet demand, this figure would have to be 14.

This index should reach 13 in 1985, as average demand grows at a rate of 5 percent a year, and the population grows by approximately 1 percent a year.

2) Attention to telex demand

We measured this by the number of telex customers for each 1,000 phone customers; in 1983 this value was five.

3) Reconstruction of Montevideo networks

As the usable lifespan of tertiary and primary cables is normally over at the ages of 25 and 40 years, respectively, it is assumed that the major part of the Montevideo cables are under those ages.

Given the real possibilities of what ANTEL can do, it has been determined that in 1985 no more than 15 percent of the cables in use will be more than 20 years old.

4) Reconstruction of Montevideo telephone exchanges

Using a criterion similar to that in point 3, ANTEL plans to replace equipment that has been in service for more than 20 years. By the end of 1987, 29 percent of this equipment will be between 5 and 20 years old, and 71 percent will be less than 5 years old.

In accordance with the maintenance and reconditioning policy, steps have been taken to proceed with maintenance at the Paso, Centro, and Ciudad Vieja exchanges, and with the reconditioning of the Centro exchange.

5) Adaptation of the long-distance system

As microwave channels provide the highest quality transmission with the best level of reliability, ANTEL plans to have 85 percent of its long-distance links use this equipment.

6) Automation in the interior of Uruguay

As the most significant factor in the development of the interior is the automation of telephone service, the percentage of automated numbers in relation to the total numbers installed is used as an indicator. This indicator is expected to reach 95 percent; at the end of 1983 it was 77 percent.

III 1981-1985 Investment Plan

In accordance with Part II, the 1981-1985 5-year plan is divided into two major subprograms called: Telephone Plan for Development; and Expansion and Reorganization of Telecommunications. These will be treated separately. In all, this means an investment of about $500 million (with Uruguayan and foreign currency being considered equivalent).

A) Telephone Subprogram for Development

This plan is designed to cover two fundamental objectives.

1) To improve the quality of service by:

a) Projects that have already been begun and which will be completed next year; for example, an increase in modern equipment in the Ciudad Vieja, Centro, and Centenario exchanges, the reconditioning of equipment that is generally too old in order to obtain an acceptable performance from it until it is replaced in accordance with the provisions of the other subprogram, a decrease in the present heavy levels of traffic by means of the expansion of the new exchanges mentioned, which will serve the areas of Centro, Union, and Pocitos, expansion of new communications links, etc.

b) Continuation of the automation of exchanges in the interior with the greatest capacity, in order to totally reorganize their networks and bring them into the national direct-dialing system. Among these, we will mention: La Paloma, Sauce, Empalme Olmo, Progreso, Toledo, etc. Other exchanges contained in the second subprogram analyzed below will also be added to this list.

c) Links between telephone exchanges have been increased by means of trunk cables, such as Union-Carrasco. The automation of the city of Pando has been completed, and the scheduled work on the renovation and expansion of networks in the areas of Pocitos, Centenario, Ciudad Vieja, Centro, Buceo, Carrasco, Las Piedras, and Cerrito is in progress; the Manga exchange has now been completed. Networks to be rebuilt, permitting the definite retirement of obsolete cables, have been planned for the following areas: Malvin, Paso, Paso de la Arena, Carrasco, Punta Carretas; and in the interior, part of the cities of Rivera, Artigas, Treinta y Tres, Melo and Maldonado; as well as all of Tacuarembo and Paso de los Toros.

VHF-UHF Communications Links

Key:

1. Planned or now being installed
2. In operation

Trunk cable has been laid linking the Atahualpa exchange with the Paso exchange; links between Paso and Aguada have been expanded with 1,200 pairs to provide service for 2,000 customers, using containers at the Atahualpa exchange.

New cables have been laid for links between exchanges, such as Centro-Pocitos and Aguada-Union. In addition, work will continue on the pressurization of cables already installed and of the new cables still to be installed.

Primary cables have also been pressurized in the cities of Salto, Paysandu, Maldonado, Piriapolis, Paso de los Toros, Las Piedras, Pando, Atlantida, Solymar, and Carrasco Este.

2) Adaptation of the telephone system in order to meet demand by:

a) The expansion of both local and long-distance exchanges.

Such work has been done at these exchanges: Centenario, the Manga satellite stations, in Montevideo, and in the interior of Uruguay in Salto, Maldonado, Salinas, Solymar, Atlantida, and Pando.

Soon expansions will be made in the Buceo, Cerrito, Punta Carretas, Piriapolis, Rocha, San Jose de Carrasco, Maldonado, Punta del Este exchanges, etc. This work will be complemented by the establishment of new exchanges in the interior and in Montevideo: Buceo, Atahualpa and Cerrito. This expansion program will help to handle the demand without delays, and will substantially improve telephone traffic.

By early 1988 the capacity of the Montevideo exchanges will have been increased to 323,000 numbers (a 70 percent increase), and 85 percent of these numbers will be in use.

By the same date, 155,600 automatic numbers will have been added in the interior (a 199 percent increase) with a similar usage rate.

In all cases, the networks will be expanded and improved.

b) Expansion of long-distance transmission equipment.

By the beginning of 1981 the following microwave systems had been established: Montevideo-Rivera (with extraction/insertion of telephone channels in Florida, Durazno, Paso de los Toros, Tucuarembo, and interconnection with a similar system in Brazil) and Montevideo-Melo (with extraction/insertion of channels in Atlantida, Minas, and Treinta y Tres), as well as the Mercedes-Fray Bentos, Rivera-Artigas, and Durazno-Trinidad branches.

Uruguay's Microwave System

Key:

1. As of December 1981
2. Now under construction
3. Contracts have been awarded
4. Projected
5. Number of terminations of voice channel (projected)

In 1982 Rosario-Nueva Helvecia and Rocha-Chuy were added to the microwave system (with extraction/insertion of channels in Castillos and Portaleza Santa Teresa), along with Santa Lucia-Canelones.

The following expansions are now planned:

System I: Canelones-Casupa, San Jose-Libertad, Artilleros-Tararíras, Conchillas-Ombues de Lavalle, Agraciada-Nueva Palmira, Mercedes-Cardona, Paysandu-Young, and Paysandu-Guichon.

System II: Pintado-Sarandi Grande, Minas de Corrales-Manuel Diaz, and Cunapiru-Tranqueras.

System III: Vergara-Rio Branco. Interconnection between Systems II and III: Durazno-Carmen, Sarandi del Yi-Batlle, Ordonez-J.P. Varela, and Lazcano-Treinta y Tres.

System IV: Piriapolis-Pan de Azucar.

With these investments, 10,000 microwave links will be created, and direct dialing service will reach 95 percent of the nation's telephone users, thus meeting the proposed goals.

B) Telecommunications Expansion and Reorganization Subprogram

This program is to include a number of projects.

1) Telex and Telegraph Service

The telex network will be expanded by installing new low-capacity electronic exchanges in Montevideo to meet demand, in order to reach a ratio of five telex users to 1,000 telephone customers.

There are plans to issue invitations for bids for the purchase of a larger-capacity telex and data facility.

Major telegraph offices will be asssigned exchange numbers so that the texts of telegrams can be transmitted like normal telex messages.

2) Standard B Ground Station and Associated Switching Equipment

To increase savings, independence, and the speed of communications, in 1980 equipment was installed for terminal telephone channels at the Manga station. Until that time, this station had received only television programs. This expansion made 60 telephone channels available for all purposes, including telex and telegraph service, making it possible to carry out the project of an exchange for special users (see B8). In addition, this equipment can be used for occasional television transmission and reception by means of the reserve radio channel.

Capacity of Major Automatic Exchanges in the Interior

Artigas	800	Paysandu	3,700
Atlantida	1,000	Peninsula (Punta del Este)	4,600
Canelones	800		
Colonia	1,300	Piriapolis	600
Durazno	1,400	Portezuelo	200
El Pinar	200	Punta del Este	6,400
Florida	1,300	Rivera	1,300
Fray Bentos	700	Rocha	800
Labarra	200	Salina	500
La Paz	800	Salto	4,000
Las Piedras	1,500	San Carlos	600
Maldonado	5,000	San Jose	1,600
Melo	1,400	San Jose de Carrasco	500
Mercedes	2,200	Solymar	500
Minas	2,100	Tacuarembo	1,800
Parque del Plata	500	Treinta y Tres	900
		Trinidad	800

Capacity of Montevideo Exchanges

Eschange	Common numbers	Numbers for special groups of users	Other numbers	Total
Centro	25,000	720		25,720
Cordon	29,700	500	300	30,500
Aguada	26,000		240	26,240
Pocitos	22,000			22,000
Paso	17,000			17,000
Union	16,000		200	16,200
Carrasco	10,000			10,000
Paso Carrasco (S I)	500			500
Barra Carrasco (S II)	500			500
Malvin	9,000			9,000
Punta Carretas	10,000			10,000
Colon	3,500			3,500
Manga	1,700			1,700
Manga Sat. I	100			100
Manga Sat. II	100			100
Manga Sat. III	100			100
Cerro	3,000			3,000

Sgo. Vazquez	500			500
Centenario	12,000			12,000
Ciudad Vieja	6,000	300		6,300
Total	192,700	1,520	740	194,960

In 1982 the equipment's capacity was saturated, and telex channels were leased through Argentina. A Standard A station is now being built (see B7).

3) ANTEL Building

ANTEL's future headquarters will be located in the building that the Banco Hipotecario del Uruguay used to occupy, on the Avenidas 18 de Julio, Fernandez Crespo, and the Calle Colonia. In addition to offices in the mezzanine area, on the ground floor, and underground space, ANTEL will occupy the top three floors and will add an additional three.

In a second phase, when the new Cordon exchange is ready, the present building, adjacent to the Banco building, will be annexed, in order to provide more office space.

At present the ground floor, mezzanine area, and the fourth floor have been redone, designed for telephone booths and customer service areas. The fifth and sixth floors are to be renovated this year.

4) Reorganization and Expansion of Montevideo's Exchanges and Networks

Starting at the end of 1986 new exchanges with electronic equipment will be introduced, whose areas of operation will partially overlap with the present areas. Equipment that is aging will be removed from service, and new equipment will be installed in its place.

At the same time, networks to be rebuilt will be designated, so that obsolete cables can finally be removed from service.

The new central exchanges to be set up are: Cerrito, Palacio, Atahualpa, Paso de la Arena, Pajas Blancas, Lezica, Ituzaingo, Punta Gorda, Buceo, and Barrio Sur.

Within this 5-year period, there are also plans to totally replace equipment in the Pocitos, Cerro, Colon, Sgo. Vazquez, Manga, and the Manga I, II, and III satellite exchanges, and to expand, also using electronic equipment, the exchanges at Ciudad Vieja, Punta Carretas, Malvin, Carrasco, and Paso. The Cordon exchange will be completely renovated and expanded. In Ciudad Vieja, Cordon, Aguada, Paso, Pocitos and Union, transit traffic will be routed from their respective dependent exchanges.

Telex Exchanges in the Interior

Key: 1. Number of customers

When the work is completed, the situation should be as follows:

Capacity of exchanges with existing equipment: 114,000 numbers.
Capacity of exchanges with new equipment: 208,400 numbers.
Customers connected: 266,400 numbers.

The difference between capacity and the number of customers is designed to provide a sufficient reserve capacity to meet demand without delay.

This plan should meet the proposed goals for both exchanges and networks.

We should point out that with this new equipment, ANTEL will be able to offer new services to customers with access to this equipment: automatic call interrupt service; conference calls between three parties; rapid dialing; automatic call transfer to a preselected number, etc. It will also be possible to use international direct dialing to reach customers in any country where this service is available (see B7).

Links between the new exchanges will be of the PCM type to be installed either in the existing trunk cables or in some cases, in special cables. This transmission system, providing 30 telephone channels on two pairs of telephone cables, has already been installed between San Jose de Carrasco

and Aguada and between Las Piedras and Aguada for long-distance service, and between Aguada and Carrasco, Aguada-Manga, Paso-Santiago Vazquez, La Barra-Maldonado, and Portezuelo-Maldonado.

5) Reorganization and Expansion of Medium, Small, and Rural Exchanges and Networks in the Interior

This project was also begun in 1982 and made the automation of Paso de los Toros, Rosario, Nueva Helvecia, and other centers feasible. About 20,000 numbers will be installed, to offer automatic service to about 10,000 manual customers, and to handle the demand for new service, by making enough numbers available. Among others to be served: S. Lucia and Carmelo.

All together, in the interior there will be approximately 90,000 telephone customers. Combined with those in Montevideo, this is a total of 356,000 for all of Uruguay, and a total of 432,000 telephones (including extension phones, internal phones, etc.). This is a ratio of 15 telephones for each 100 inhabitants.

6) Standard A Ground Station and Switching Center

As has already been indicated, in 1982 the telephone channels provided by the Standard B station were found to be insufficient. For this reason, a Standard A station with a larger capacity and improved operating conditions is being built. Contracts have been awarded for the construction of this station, and it was due to be completed during the second half of 1984.

In 1986 an international automatic central exchange will be set up so that customers served by electronic exchanges and by the electromechanical exchanges of Centro, Ciudad Vieja, and Centenario will be able to communicate automatically with countries which have this service.

7) International Exchange for Special Customers

In order to facilitate traffic for a small number of users with special interests abroad, a central exchange was established for 100 preferential users, who can make international connections automatically, by using links at the Standard B station, and by ground communications, via microwave, with Argentina and Brazil. This exchange will be withdrawn from service sometime after 1985, once the new international exchange is ready. At the end of 1983 its capacity was used at a rate of 69 percent.

8) Rural Telephone Systems

The use of frequencies reserved for this service has been coordinated with neighboring countries. There are plans to implement this service gradually. It will provide access to the national and international telephone systems for users who are scattered in the rural areas of the interior of Uruguay.

They will be connected to 43 centers of this type, with a final capacity sufficient for 2,580 customers. A usage rate of 40 percent is estimated by the end of 1988.

Contracts have been signed for the first phase of this work, and the work is now in progress, covering part of the areas located north and south of the Rio Negro. During 1984 and 1985, 15 centers will be prepared for 450 users, in the following order: Paysandu, Chapicuy, Montevideo Chico, Las Toscas, Minas de Corrales, Vichadero, Cunapiru, Cota 205, Carmen, Sauce, Termas del Arapey, Biassini, Mataojo, Guichon, and Peralta.

9) Data Systems

During 1982 and 1983 a data switching and transmission plan was prepared in order to meet the needs created by the constant growth of data processing terminals. For this purpose, CONADI [National Information Systems Commission] requested that a delegate from ANTEL take part in a CONADI working group to establish appropriate coordination between communications and information systems. As a result of the first work done by the group, plans for data transmission were developed, which are now being analyzed at the planning levels of ANTEL. This means that there is as yet no official ANTEL position. This work was complemented by the preparation of a survey conducted under CONADI's auspices, to determine technical characteristics of the users' terminals and the number in each possible category. This survey has not yet been completed. An ITU [International Telecommunications Union] specialist was hired for this project, using UNDP [U.N. Development Program] funds.

7679
CSO: 5500/2067

BRIEFS

KHOST, FARAH T.V. STATIONS--KABUL, (BIA)--A television station was inaugurated in Farah province, west of the DRA yesterday and started its telecasts. The station which is equipped with modern technical facilities was established on the basis of a joint development plan of the Ministry of Communications and the State Committee of Radio-Television and Cinematography of the DRA as Ghazni, Kandahar, Herat, Nangarhar and Faizabad. [Text] [Kabul KABUL NEW TIMES in English 17 Apr 85 p 1]

CSO: 5500/4734

BANGLADESH

DETAILS OF PLANNED DHAKA-CHITTAGONG MICROWAVE LINK

Dhaka THE NEW NATION in English 20 Mar 85 p 8

[Text]

A new microwave link will be set up between Dhaka and Chittagong replacing the old one by August this year to improve the communication system including the transmission of the television programmes, reports BSS.

This will have three microwave links with each of 1800 channels. Television will be given a separate radio link after the new microwave system is set up.

At present, a 960 channel system microwave is working between Dhaka and Chittagong with an alternative system of another preventive microwave of 960 channel system in existence The television transmission is being done to Noakhali, Chittagong, Cox's Bazar and Rangamati through this system.

But the system is inadequate for the demand of the country and as such Government is planning to improve the system. The work for microwave link was taken up by the then Pakistan Government in 1970-71 but the work was not only left unfinished but also part of the work done was damaged when the Pakistani army left the country. Bangladeshi engineers and technicians completed the work in 1972 without the foreign assistance and installed the microwave links. This system has been maintaining the communication of Chittagong with Dhaka and others places

The setting up of the new microwave system will remove the problems being noticed in transmission of television programmes and improve the communication system. This will also improve the telephone system and particularly NWD subscribers will easily get Chittagong and its nearby exchanges. Besides, this will also help expand telecommunication system with foreign countries.

CSO: 5550/0068

WORK ON INDIGENOUS SATELLITE SYSTEM NOTED

Madras THE HINDU in English Survey of Indian Industry 1984 pp 219, 223

[Text] THE use of satellites for earth resources observation and mapping is now well established. Space-based earth observation systems offer the special advantages of enabling synoptic and systematic acquisition of the related data and making available the same with short turn-around times to resource managers and planners.

Currently, India is making use of imagery provided by the U.S. Landsat and French SPOT satellites for obtaining data on terrestrial resources. However, the importance of having our own dedicated spacecraft for this purpose considering coverage, cost, security and accessibility has long been realised by the planners of the Indian space programme. One of the important objectives of this programme has been to realise an operational remote sensing system using space platforms for the monitoring of earth resources and environment.

Earlier efforts

Evolution of the related efforts over the last decade towards this goal included conduct of aerial flights, development of a variety of remote sensors, setting up of ground-based data processing and interpretation hardware and carrying out specific end-to-end application experiments using aerial and satellite imagery in close coordination with a number of user agencies.

A major landmark in these efforts was the planning and implementation of the Bhaskara I and II experimental satellite programmes in the time frame of 1976-82. These programmes provided valuable experience and insight into a number of aspects such as sensor system definition and development, conceptualisation and implementation of a space platform, ground-based reception and processing, data interpretation and utilisation as well as issues relating to the integration of the remotely-sensed data with the conventional data systems for resource management.

First satellite by 1986

The Indian Space Research Organisation (ISRO) has now taken the next logical step of developing a national satellite-based remote sensing system in the Eighties. Known as the Indian Remote Sensing (IRS) satellite system, this will generate resource information in a number of areas such as agriculture, forestry, geology and hydrology. The IRS project was formally approved by the Government in June 1982 and is expected to cost Rs. 60 crores for the first phase which includes two satellites, IRS-1A and IRS-1B. The project has now progressed into the hardware realisation phase and all elements of the programme are at present on schedule to meet a launch of the first satellite in the second half of 1986.

As outlined in an article by R. R. Navalgund and K. Kasturirangan of ISRO in the Proceedings of the Indian Academy of Sciences (December 1983 issue), the space segment of the IRS system will consist of a three-axis stabilised, polar, sun-synchronous satellite with suitable multispectral scanners.

The IRS-1 will have an overall weight of 950 kg including 80 kg of hydrazine propellant. A parallelopiped in overall configuration, the spacecraft measures 1.56 x 1.66 x 1.10 metres. Deployable solar arrays, each consisting of three panels of 1.1 x 1.3 m are stowed on either side of the satellite and are capable of providing 540 watts at the end of life. Two 40 ampere-hour nickel-cadmium batteries provide supplementary power for orbit night as well as peak requirements during payload operations.

The heart of the attitude control sys-

tem is a set of four reaction wheels, three of which are mounted in an orthogonal triad along the pitch, roll and yaw axes of the satellite. The fourth wheel, mounted in a skewed fashion, provides functional redundancy to the other wheels. Two magnetic torquers along the pitch and roll axes are used for momentum dumping of the reaction wheels thereby conserving thruster fuel.

The sensors include IR earth sensors for pitch and roll error measurements, rate integrating gyro for yaw error detection, sun sensors for pitch and yaw error measurement during acquisition and magnetometers for momentum dumping operations. These sensors enable attitude determination to an accuracy better than plus or minus 0.10 degree. Further, a star sensor is used to improve the accuracy of attitude estimates to better than plus or minus 0.02 degree.

The stringent requirement on the pointing accuracy of the platform arises due to the fact that in applications like crop identification and acreage estimation the registration of multitemporal and multiband images needs to be within plus/minus one pixel accuracy.

The main component of the IRS-1 payload is a pair of linear imaging self-scanned sensors (LISS) which, unlike the multispectral scanners in the Landsats, work on the concept of "pushbroom scanning". In this mode of observation, each line of the image is electronically scanned by a linear array of detectors, located in the focal plane of the system and successive lines of the image are produced as a result of the satellite's movement. Charge-coupled devices (CCDs) are used as detectors in IRS. Such an approach has the advantages of maximising the exposure time for each ground point and ensuring excellent photogrammatic quality along the scan axis. Each detector array provides data in a single spectral band and additional spectral bands are covered by multiple arrays with appropriate separation systems.

The payload parameters have been selected taking into account the applications priority. Under the IRS-1 programmes, agricultural applications are the first priority followed by vegetation mapping, regional geological mapping, groundwater exploration, flood mapping, drought monitoring and broad urban/land uses.

The orbital characteristics of the IRS-1 have been fixed taking into account better geographical coverage from a single ground station, low drag effects, less frequent orbit correction requirements in order to conserve fuel, possibility of orbit determination with better accuracies, local time of the satellite passage over India (around 10 AM) to suit the requirements of agriculture and geology applications and other considerations.

The ground segment of the system comprises the TTC network of ISRO, a mission and spacecraft operations control centre coming up at Bangalore and the payload data reception and product generation system being established at the National Remote Sensing Agency, Hyderabad. Payload data will be transmitted on the X-band (8.3 GHz) and S-band (2.2 GHz). The data will be converted into products in the form of high density digital tapes, 70-mm film, microfische, 240 mm black and white as well as colour prints, computer compatible tapes and false colour composites by four different levels of processing.

A comprehensive utilisation programme for the system was drawn up in 1982. The core of this programme consists of the following types of application projects:

Operational application projects: Flood mapping, groundwater exploration and regional geological mapping;

Quasi-operational application projects: Soil mapping, drought monitoring, land use/land cover mapping and land degradation including desertification;

Experimental application projects: Crop production forecasting, forest mapping and damage detection, water quality monitoring, watershed characterisation, monitoring of coastal environment and marine fisheries.

The IRS utilisation programme is expected to provide significant inputs to the National Natural Resources Management System. Such remote sensing-based information is expected to increase tremendously in volume and scope with the future launching of more sophisticated and application specific areas utilising sensing in the other spectral bands.

DSO: 5550/0081

INDIA

PLANS TO LAUNCH 'STRETCHED ROHINI' SATELLITE TOLD

Madras THE HINDU in English 13 Apr 85 p 1

[Text]

MADRAS, April 12.

A 150-kg satellite is to be launched from Sriharikota in September this year on board the Indian Space Research Organisation's new Augmented Satellite Launch Vehicle (ASLV).

The first of the Stretched Rohini Satellite Series, the satellite is programmed to be put into a near-circular orbit some 400 km above the earth. It will carry what scientists call a technical payload—sensors and instruments to monitor temperatures and pressures—but no camera since this launch is primarily going to be a test of the capability of the rocket to handle a 150-kg payload.

The heaviest payload so far has been the 39-kg Rohini-D2 satellite which SLV-3 successfully hoisted into an elliptical orbit in April 1983 and therefore the transition to the "150-kg class" with the ASLV is being described as "a quantum jump".

Boosters: The ASLV retains much of SLV's configuration, but has a pair of boosters strapped on to the lower segment of the rocket. The boosters, which fire first, will provide the increased thrust to lift the extra payload.

Advances in propellant technology have helped ISRO come up with an improved formulation that scientists claim will generate more energy, kilogram for kilogram, compared to the one used in SLV-3.

Another improvement over the SLV-3 design is the provision of an inertial navigation system. Information about the position of the craft, its velocity and direction of movement will be continuously fed into a computer on board, which will then generate the relevant steering commands to keep the vehicle on its pre-determined course.

Delayed: The launch was earlier scheduled to take place in June but last November's cyclone, which brushed past the spindle-shaped island, caused enough devastation to buildings and facilities in the complex to put the clock back by three months.

The cyclone had tormented the island for more than two days with wind speeds upto 225 kmph and non-stop torrential rain. The island frequently finds itself in the way of the cyclones from the Bay of Bengal, but the resident meteorologist thumbing through the records could not find anything as violent as this in the last 60 years.

At the Static Testing Evaluation Complex, where rocket motors and sub-systems are rigorously tested for performance with high-precision sensors and computers, the rain left a building under half a metre of water. For another three weeks, there was no humidity control within the building, and the range of electronic equipment which are highly sensitive to humidity levels ended up

with a film of fungus and needed careful repair. The schedule of tests was set back by almost two months.

Weather-proof: One bright note, however, did emerge. The ASLV's first stage motor, which was to have been test-fired on November 15, lay on the test-bed fully exposed to the fury of the cyclone, which struck the day before. But when it was finally tested in January, the motor fired perfectly, as well as it was designed to. Tests on the other motors—there are six of them—are expected to be complete next month.

Other facilities suffered similar losses—the overall damage due to the cyclone ran into a few crores of rupees—but the worst befell the luxuriant forest that cloaks the 13,200 hectare island. It is estimated that about 70 per cent of the trees were downed, while another 20 per cent died standing.

The Army's Bailey Bridge that was rushed to the marooned island still serves as the only link to the mainland. But the wood and steel structure cannot take loads heavier than a bus full of people, posing severe limitations on the movement of heavy equipment. Another temporary bridge capable of handling loads upto 30 tonnes is being erected.

CSO: 5550/0077

INDIA

PAPER REPORTS ON SATELLITE LAUNCHING PROGRAMS

BK251412 Delhi THE HINDUSTAN TIMES in English 19 Apr 85 pp 1, 16

[Text] New Delhi, April 18--The launch of the first Indian 150-kg satellite atop the indigenous Augmented Satellite Launch Vehicle (ASLV) has been set for September this year, three months behind schedule.

The performance budget of the Space Department for 1985-86 released here today says that the delay has been caused by the damage inflicted on the launch centre, SHAR [Shriharikota Range] at Shriharikota on the Andhra coast by last year's cyclone. The cyclone damaged operational building, submerged the road connecting SHAR to mainland and disrupted the power supply. The damage is estimated at Rs 4 crore and the facilities damaged are being reconstructed.

With the launch of the Stretched Rohini series of satellites of 150-kg atop the ASLV, the space programme moves to the next important phase after the SLV-Rohini development. The ASLV marks a new series of launch vehicles with strap-on boosters at the first stage (each booster equal to the first state of SLV-3) and a liquid propulsion second stage.

It would open the way for the first really large size Indian rocket, the Polar Satellite Launch Vehicle (PSLV) with payload capability of one tonne satellites to be placed in precise orbits.

While the sanctioned cost of ASLV is Rs 19.73 crore, that for the PSLV which would be ready by 1988 is Rs 311.52 crore. A special launch facility for PSLV at a cost of Rs 25 crore is to be developed.

The steady growth in the Indian capability of designing and making larger and larger size rockets (or launch vehicles) has also meant opening of new facilities for their testing and construction and related activities. While a new facility is being opened at Mahendragiri in Tamil Nadu specially for liquid and solid propulsion systems, a new facility is coming up at Vellamalal near the Trivandrum establishment of the Vikram Sarabhai Space Centre, for the avionics and rocket structural group.

The Performance Budget also reveals that by the end of the current decade India would acquire capability of indigenous design and construction of both the communication-meteorology INSAT [Indian National Satellite System] satellites and the natural resources sensing IRS satellites. It would also acquire the capability of putting the IRS satellite into orbit with its own launch vehicle.

This would take the country into the next phase of development in the 1990s when India would not only have separate series of INSAT and IRS [Indian Remote Sensing] satellites but would, by the middle of the decade, have capability of designing and launching the Advanced Communication Satellite with enormous increase in communication, television channels and very high radiation mapping of the upper atmosphere for meteorological purposes. This advanced communication satellite would also be launched with the high payload capability of Indian Launch Vehicle, Geo-Satellite Launch Vehicle.

CSO: 5550/0084

INDIA

ASIAN NEWS AGENCY ORGANIZATION MEETS IN DELHI

New Delhi PATRIOT in English 31 Mar 85 p 8

[Text]

The sixth general assembly of the Organisation of Asian and Pacific News Agencies (OANA) on Saturday made a fervent appeal to the governments in the region to reduce communication tariffs strangulating the development of the regional news network, reports UNI.

The assembly, which ended its five-day session in Delhi, called for an early meeting of information and communication ministers of the 20 member countries for lowering tariff rates throughout the region. Minister of Information and Broadcasting V N Gadgil was urged to take an early initiative in convening the meeting.

The Press Trust of India took over the presidentship of the 25-member OANA from the Malaysian news agency Bernama as member agencies reaffirmed their commitment to strengthen the organisation and give it new dimensions.

The assembly, attended by over 80 delegates unanimously adopted a resolution expressing full support to the United Nations Educational, Scientific and Cultural Organisation (UNESCO) in its efforts to secure a new international information and communication order.

The assembly, while noting the impressive strides the Asian News Network (ANN) has made in three years of its operation stressed the need to tone up professional standards of the news agency stores and also overcome telecommunication problems hampering adequate and timely exchange of news and information.

It decided to set up an expert group to study the rapid developments in information technology and see how these could be applied to exchanges under ANN in the fields of telecommunication links, electronic teleprinters, computerisation and development of computer-based reference archives.

The ANN, delegates emphasised, provides a change "to see Asia through Asian eyes and there was growing need for expanding the network's field of activities especially in sports, culture, economic developments."

The introduction of a photo service for the ANN was agreed on as a new area of cooperation among member agencies and an eight-member ad hoc committee comprising PTI, Bernam, IRNA (Iran), Antara (Indonesia), Kyodo (Japan), Yonhap (South Korea), VNA (Vietnam) and PNA (The Philippines) was constituted to study the feasibility of the project.

New OANA president N R Chandran affirmed PTI's commitment to take the ANN forward in the same tempo as set by the Bernama. IRNA, Antara and Kyodo were elected the new vice-presidents, while APP (Pakistan), KPL (Laos), MONTSAME (Mongolia), Lankapuvath (Sri Lanka) and Bernama became the new members of the executive board.

UNESCO representative S M Ali, expressing his organisation's continued commitment to the success of OANA announced a grant of 75,000 dollars for the further development of the network.

Outgoing president Ahmad Mustapha Hassan of Bernama affirming his agency's continued efforts to strengthen the OANA, expressed the hope that the network would attain greater hights under the stewardship of PTI.

Hegde meets PM

Karnataka Chief Minister Ramakrisha Hegde on Saturday met Prime Minister, Rajiv Gandhi, their first meeting after the recent Assembly elections, reports PTI.

Mr Hegde told PTI that he requested the Prime Minister to give early assent to the Panchayat Raj Bill pending before the Centre for a long time and for implementing the Vijayanagar Steel Plant in Dharwar.

CSO: 5550/0073

COMMUNICATIONS MINISTER HOLDS BOMBAY PRESS CONFERENCE

Bombay THE TIMES OF INDIA in English 5 Apr 85 p 1

[Text] New Delhi, April 4--Separate corporations are likely to be set up to manage telephones in Bombay and Delhi.

The objective is to facilitate induction of high technology and mobilisation of resources through bonds and the like, without the constraints to which departmental undertakings are subject.

An inter-ministerial committee has been constituted to make the requisite studies and submit a report in three months.

The move comes soon after the bifurcation of the P and T into postal and telecom departments with consequential structural changes.

The minister of state for communications, Mr Ram Niwas Mirdha, also announced at a press conference here today that the country's first digital electronic exchange under the CIT-Alcatel agreement would be commissioned at Worli in Bombay on Wednesday.

The factory fot the manufacture of 500,000 lines of this type per year has already been set up in Mankapur, near Gonda, in U.P. Supplies are scheduled from this year onwards.

Under the agreement, the collaborators are to supply 200,000 lines, of which 10,000 lines will be absorbed in Worli.

Eleven other new exchanges of this type are likely to be completed during 1985-86: Delhi (Karol Bagh tandem), Madras (Anna Road tandem), Kanpur (Lajpatnagar), Hyderabad (Saifabad), Pathankot, Ahmedabad (Railwaypura), and Sriganganagar.

The minister explained that with the bifurcation, one of the most important recommendations of the Sarin committee which went into telecom modernisation had been implemented.

The department of posts will function through a board known as "postal services board." The secretary to the department of posts will be its chairman.

The department of telecommunications will similarly function through a board known as "telecommunication board" in all matters other than work relating to wireless planning and co-ordination (WPC), Overseas Communications Services (OCS), Indian Telephone Industries Ltd (ITI) and Hindustan Teleprinters Ltd (HTL). The secretary to the department of telecommunications will be its chairman.

He said Rs 13,000 crores had been sought for telecom during the seventh plan. For the current year the outlay would be just about the same as last year (Rs 835 crores).

The need for modernisation is underscored by the lengthening waiting list (857,000 as on February). None the less, he said last year there was a big increase in new connections. Bombay Telephones gave 5,420 new connections which is the highest for any unit. In Delhi too, 25,435 net new connections were given, which is the highest for any year so far.

In the current year also, a net capacity of 300,000 lines is being added and it is expected that around 200,000 net new connections will be given.

The minister thought, however, that priority needed to be given to telex connections widely sought by government offices, trade, industry and media. In all the four metro cities with the installation of SPC electronic telex exchanges and commissioning of their expansion schemes, telex connections are available on demand. The spare capacities available in the four metropolitan cities are 3,200 in Delhi; 1,700 in Bombay; 450 in Calcutta; and 590 in Madras.

As part of the modernisation programme, ITI and ECIL have joined in a programme to manufacture telex exchanges using the latest technology that might have to be imported.

Answering a query on the new policy of licensing telecom manufacturers, the minister explained while switching and transmission equipment would remain in the public sector, instruments at the subscribers' end could be turned out by private or joint undertakings.

Two new units, one at Bangalore and the other at Naini, would manufacture dial-type telephones with Italy as collaborators. The tie-up pact provided for push-button type phones as well, he added.

On the postal side, he spoke of the enormous volume of mail handled by the department and there was no option to mechanisation. Telecom Consultants, a public-sector undertaking, has been asked to prepare a project report. The project would be first taken up in Bombay.

Further, the department would encourage the use of franking machines which can do away with the sticking of stamps which takes time and costs more.

CSO: 5550/0080

INDIA

REORGANIZATION URGED BY TELECOM PANEL CARRIED OUT

Madras THE HINDU in English 5 Apr 85 p 7

[Text]

NEW DELHI, April 4

The bifurcation of the P and T Department has been formalised with the splitting up of the P and T Board into Postal Services Board and Telecommunications Board. The reorganisation is based on the recommendations of the Committee on Telecommunications, set up in May 1981, under the Chairmanship of Mr H. C. Sarin.

According to an official announcement, the Department of Posts will function through the Postal Services Board which will be headed by the Secretary to the Department of Posts. It will consist of four members in charge of operations, development, personnel and finance besides the Chairman. The Secretary to the Board will be of the rank of Joint Secretary.

The Department of Telecommunications to function through the Telecommunications Board will be headed by the Secretary to the Department of Telecommunications also of the rank of Joint Secretary to the Government. This Department will have five members in charge of operations, development, technology, personnel and finance. It will also have a Chairman.

The Telecommunications Board will, however, not handle work other than that relating to wireless planning and coordination, overseas communication service, Indian Telephone Industries Ltd and Hindustan Teleprinters Ltd. These will be dealt with by the existing set-up of Additional Secretary and officers of the erstwhile Ministry of Communications. They will function within the Department of Telecommunication.

Orders have also been issued in respect of reallocation of erstwhile combined functions, staff and assets. The Department of Telecommunications will mainly be located in the "Sanchar Bhavan" and the Department of Posts in the "Dak Tar Bhavan". Telegraph services in small post offices ad in rural areas will continue to be rendered by the Department of Posts.—Our Special Correspondent.

CSO: 5550/0075

INDIA

COMMUNICATIONS MINISTER SPEAKS AT BANGALORE MEETING

Indigenous Telecom Network Plans

Bombay THE TIMES OF INDIA in English 13 Apr 85 p 12

[Text]

BANGALORE, April 12: In the next three years, the country will have an indigenously telecommunications network, Mr. Ram Niwas Mirdha, Union minister for communications, declared here yesterday.

A centre for the development of telematics had been set up with a budget of Rs. 35 crores, the minister told delegates attending a two-day convention on "communications and information explosion."

Mr. Mirdha said the Centre would tap the talent of non-resident Indians, who were experts in the field. However, India's telecommunications problems, being peculiar to her geography and environment, could not be solved by foreigners alone.

Mr. Mirdha called for a thorough re-examination of programmes broadcast and televised to judge their appropriateness to the needs of the country.

Stressing an "attitudinal change" at all levels, he recommended a training programme to include even senior most officials who were often alienated from the latest development.

Future developments in the field would centre around digital technology in India, he said. In the seventh plan, three million telephone lines would be added to the present three million and another ten million lines would be added during the eighth plan.

The government planned to establish an integrated national digital telecommunications network by the turn of the century for economical and speedy transportation of information including voice communication, data transfer, video and facsimiles he added. During the seventh plan, 75 secondary locations would have modern digital works which are co-terminus with the boundaries of one or more revenue districts.

To meet short term needs a modern packet switched network would be integrated with the existing electronic telex network and the public switched network to provide services like telefax, videotex, facsimile and so on in the next five years.

Private Sector Phone Production

Bombay THE TIMES OF INDIA in English 14 Apr 85 p 5

[Text]

BANGALORE, April 13.

THE Union government has licensed 22 private sector units to manufacture telephone instruments.

Mr. Ram Niwas Mirdha, Union minister of state for communications, told reporters here on Thursday that apart from the private units, five state-owned corporations, including the Karnataka electronic development corporation, had been licensed to manufacture the instruments. Each unit would have a production capacity of 500,000 instruments.

He clarified that the private units would not be allowed to negotiate the import of technology on their own. The government had decided to have a centralised import system for both private and public sector units for the manufacture of the instruments.

Mr. Mirdha said the inter-ministerial committee set up to go into the question of setting up a public sector corporation to run the telecommunication services in Bombay and Delhi would submit its report in three months. The government proposed to try a corporate form of management for the proposed corporation to see whether it would be an improvement on the present departmental form. Further, a public sector corporation would be able to raise institutional finance for expansion of these services. Depending upon its success, the same type of management might be introduced in other major cities such as Calcutta, Madras and Bangalore.

NATIONAL TELEX

He said it was proposed to develop a national telex facility in the country. At the end of the seventh plan, telex lines may be available on demand, he felt.

The Central government would take an investment decision regarding the proposed electronic-switching project in Bangalore very shortly. The long-delayed project might come up in the early part of the seventh plan. French technology now being tried in the Gonda unit might be introduced in the Bangalore project. The Rs. 136-crore project would help phase out product lines of electro-mechanical switching equipments.

Mr. Mirdha also said the Indian Telephone Industries (ITI) has achieved a record turnover of Rs. 226 crores in 1984-85 and the pre-tax profit is estimated at Rs. 18 crores.

Mr. Mirdha, said that while the Bangalore complex had a turnover of Rs. 134.87 crores, the Naini unit had a turnover of Rs. 40 crores. The turnover of Rai Bareili, Palghat and Srinagar units were Rs. 44.34 crores, Rs. 2.5 crores and Rs. 4.86 crores, respectively.

ITI has been able to contribute from its production units 6,37,798 telephone instruments, 1,62,256 lines of switching equipment and Rs. 60 crores worth of transmission equipment, besides spare parts worth Rs. 15 crores. During the sixth five-year plan period, it had manufactured equipment worth Rs. 862.38 crores.

Mr. Mirdha said during the seventh plan, the country would require about three million additional telephone lines and this was expected to go up to 10 million by the end of the eighth plan. At the end of the seventh plan, the ITI turnover was expected to be Rs. 1,300 crores.

COMMUNICATION STRIDES

He said the ITI would also go in a big way to help ancillary units. A component acceptance centre had been set up recently to ensure quality. The Rae Bareili cross-bar division completed its supplies for ten exchanges, including the Shankarapuram exchange in the city which was opened on Thursday. Another ten exchanges for 30,000 lines are likely to be completed during 1985-86.

The ITI is also initiating work in research and development to keep pace with changing technology, like digitalisation, optical communications, and microprocessor-based systems. A sum of Rs. 15 crores has been invested in R & D in the Bangalore and Naini units.

CSO: 5550/0078

PLANS FOR IMPROVING TELECOMMUNICATIONS REVIEWED

Madras THE HINDU in English Survey of Indian Industry 1984 pp 213, 215

[Text]

THE Department of Communications has been assuring the country that the quality of its service will improve during the Seventh Plan with an integrated and balanced growth of the telephone network. The integrated digital network which will be built as early as possible will ensure the promised improvement in service through speedier fault clearances in digital electronic switching and transmission systems. There are plans to replace d 5 lakh lines of worn out, time expired and manual exchange equipment.

The steps being taken to improve the performance of local and long distance network provide for the installation of special computerised testing equipment at the metropolitan centres of Delhi, Bombay, Calcutta and Madras known as Automatic Traffic Analysing Complex (Autrax). These are already in service.

Telephone exchanges in the country have to function in an adverse environment. Digital electronic exchanges have stringent environmental limits for operation. The Telephones Department has had to take note of the fact that the provisioning of the air-conditioning system suitable for the French E-10-B exchanges has posed problems in the Indian environment. It has called for a suitable designing of the air-conditioning systems and false flooring at the places of installation. The air-conditioning plants have also had to be duplicated. The technical problems which had arisen in respect of inter-exchange junctions linking the E-10-B exchanges necessitated the procurement of pulse code modulation (PCM) systems.

One of the Seventh Plan objectives is to meet most of the existing and anticipated demands for telephones by 1990. The Communications Department seems to have given itself a very tall order. According to its own projections, the demand for telephones is expected to be between 81 39 lakh and 83 10 lakh direct exchange lines (DEL) by March 31, 1990 and this is expected to shoot up to between 186 9 lakh and 193 19 lakh lines by March 31, 1995. The target adopted for March 31, 1990 is the provision of 76 63 lakh DELs for purposes of investment planning. Doubts over the ability of the department to achieve this staggering task arise from its own performance during the Sixth Plan. It is expected that by the end of the current Plan, it would have been possible to add only 10 09 lakh DELs which falls far short of the target of 13 3 lakh DELs and the total number of DELs could go up from 20 16 lakhs on April 1, 1980 only to 30 25 lakhs by April 1, 1985.

The task relating to exchange capacity augmentation faced by the Communications Department is just as colossal. The country's switching capacity would go up from 23 3 lakh lines on April 1, 1980 to an anticipated 35 29 lakh lines on April 1, 1985. The total capacity required at the end of the Seventh Plan to correspond to the targeted 76 63 lakh DELs will be 88 97 lakh lines.

Optical fibre cable network

For effective use of the switching capacity and for improvement in the local network performance, there will have to be massive inputs of digital microwave and pulse code modulation (PCM) systems on fibre optic and copper cables. Among the import

ant features of the Seventh Plan proposals is an extensive "ducting" programme for a stretch of 2,500 km for the protection of local cables which are at present subject to frequent damage resulting in large-scale dislocation of service. It is proposed to lay about 4,000 kilometres of optical fibre cables in the intra-city network. About 360 high and medium intra-city digital microwave systems will be added in the local transmission network. A huge number of 33,000 PCM terminals is also proposed to be installed during the Plan for fully exploiting the capacity of these high grade media. The existing copper cables will require further augmentation. These massive inputs of digital microwave and fibre optic systems will call for special efforts to build up skills in these areas.

Among the weakest and most unsatisfactory links in the telecom network is the STD (Subscriber Trunk Dialling). The Department of Communications proposes to launch a determined attack on the deficiencies of the STD and also to expand the network. The objective is to cover a maximum number of local automatic exchanges in the country. The Indian Telephone Industries factory at Palghat has a capacity for the manufacture of 30,000 lines of digital trunk automatic exchanges and the capacity will be further raised to 1.20 lakh lines during the Seventh Plan. The expansions will be with digital electronic exchange equipment.

Greater use of digital equipment

During the Seventh Plan there will be greater and more widespread use of digital equipment. The DELs will have about 58 per cent of electronic type, 20 per cent Strowger and 22 per cent of the crossbar type. In long distance transmission, 59 per cent of the medium is likely to be of the digital type by the end of the Seventh Plan.

The first steps which the telecommunication services will be taking into high technology will be into the electronic exchange switching system of which a great deal has been heard during the last three years. The first ESS factory of ITI in the public sector is coming up at Mankapur in the Gonda district of Uttar Pradesh. It will manufacture five lakh lines of ESS and the estimated cost of the project is Rs. 177.02 crores. The factory is expected to go into production in 1989. There will be two more ESS projects—the ESS-II at Bangalore having the same capacity as Mankapur and the third one, the Electronic Automatic Exchange Project at Palghat. All the three projects will be getting technology transfer from CIT-Alcatel of France. What is, however, more important is that both the Department of Electronics and the Department of Communications are working jointly on a major project for the development of a totally indigenous digital electronic switching system within the next three years. The third ESS factory will be producing equipment conforming to the indigenous design being developed currently by the Centre for the Development of Telematics, shortly known as C-DOT.

Development of indigenous ESS knowhow

There has been scepticism over the success of the efforts of the DOE and ITI in developing a wholly indigenous system within a short span of three years. It is possible that a good part of the scepticism had arisen from a failure to grasp the content of the efforts at designing indigenous technology for ESS. One reason why it might have appeared that the DOE and the ITI were being foolhardy in trying to design and develop an entirely indigenous digital electronic system was probably that the technology transfer initially being made by CIT-Alcatel was only for E-10-B which is not a wholly digital but hybrid—partly analogue and partly digital system. It will take some time even for CIT-Alcatel to transfer the technology for the wholly digital E-10-S. Why should the DOE or for that matter the ITI imagine that they had the capabilities to design a wholly indigenous digital electronic switching system within three years?

Much of the forbidding complexity of digital electronic exchange systems developed abroad arises from the integration of separate technologies and services embodying different skills and spread over several disciplines. India cannot hope to prise these open and get to know them better if the party offering the system has developed a good part of it as proprietary items and is keeping a lid over them. If India is negotiating with such parties, the content and speed of technology transfer will be hardly satisfying. This will be the case with systems like the system 1240 developed by the International Telephones and Telegraphs of U.S. (ITT).

Happily this does not seem to be the case with all the systems developed abroad. The exclusiveness which can be claimed for a good part of the new technologies making their debut on the international arena is restricted to

a small though hard core. Most of the support which the technology gets is from a variety of hard and software other equipment and services which have come together to build the system but which can be obtained separately from different parties provided we know how to scout for them and have the expertise to negotiate and buy what is needed. In the case of software indigenous skills may be available in a measure much larger than is generally believed. This appears to be the DOE's line of thinking in respect of the ESS technology.

Among the problems which have frustrated Indian engineers attempting a faster pace of technology indigenisation is the lack of knowledge of the parties supplying services and equipment required. The ITI and the C-DOT however will now find things a lot easier because they have the services of Mr. Sam Pitroda, an expatriate Indian telecommunication engineer in the U.S. who knows where to look for what and how to get them too.

Successful technology transfer from abroad has very often been frustrated in the past because of the difficulties felt and the consequent failures in implanting an imported technology into the Indian environment. This has been the case with telecom technology also. Imported standard technology does not work in non-air conditioned Indian environment and pressing such technology into service in such environment calls for a certain expertise which only those who have an understanding of the support needed to make them work have. The C-DOT depends heavily on the services of Mr. Pitroda in this area. It also depends heavily on the knowledge of the large number of parties in the U.S. marketing equipment and services for digital telecom network for building up an indigenous ESS. For instance, a large number of specialised agencies in the U.S. provide the services required for the inspection of components going into the ESS. The DOE has already done a knockdown of the large number of components going into the E-10-B and E-10-S systems of CIT-Alcatel and the areas where it would be necessary to obtain them from abroad.

All these sound promising but there is no need to delude ourselves that the task of developing an indigenous ESS is going to be easy. Even the absorption of the E-10-B and E-10-S technology by ITI could run into rough weather. The E-10-B technology to which the ESS factory at Mankapur will conform has eight custom made microprocessor LSIC (Large Scale Integrated Circuitry) chips. The State-owned Semiconductor Complex Ltd (SCL) at Chandigarh proposes to make these chips for ITI. It cannot, however, get the designs from its U.S. collaborators American Microsystems Inc. (AMI) for these as they are proprietary items of CIT-Alcatel. SCL does not have the exact details of the custom made chips. It is going to take some time before SCL sorts out these and other problems. The C-DOT also wants that the custom made chips which SCL would be making should have certain other functions in subscriber dialled digits.

The C-DOT has placed orders for a VAX computer from the U.S. which will be used for software development for the indigenous ESS it is designing. A hazard here is that there may be difficulties in getting the computer from the U.S. because of its policy of banning export of sensitive technology. There are alternative computers conforming to Nordic systems which will be available to the C-DOT if there is any hitch about getting the VAX computer from the U.S. C-DOT is putting up a centre in Bengalore for making hardware for the indigenous ESS.

CSO: 5550/0081

INDIA

SUCCESSES IN, PLANS FOR TELEVISION EXPANSION

Madras THE HINDU in English Survey of Indian Industry 1984 p 217

[Article by B. S. Padmanabhan]

[Text]

NINETEEN eightyfour can aptly be described as a "year of television revolution" for India as over a period of just nine months the population covered by the Government-owned mass media network of Doordarshan has risen more than two fold

At the beginning of the Sixth Plan hardly 25 per cent of the population had access to any television programmes The Doordarshan had just 18 high powered transmitters of which only seven, located at Delhi, Bombay, Calcutta, Madras, Srinagar, Jalandhar and Lucknow, were full fledged centres Of the rest, four were only relay transmitters located at Amritsar, Pune, Mussoorie and Kanpur and seven were transmitters set up under the SITE (satellite instruction television experiment) programme

The Sixth Plan programme envisaged setting up of an additional four full fledged centres at Ahmedabad Bangalore Trivandrum and Guwahati with studio facilities and eight relay transmitters Besides these the provision of studio centres at Jaipur and Hyderabad construction of permanent studio buildings at Lucknow and Calcutta and augmentation of the TV transmitter at Delhi were contemplated The total outlay provided for this plan was around Rs 87 crores

Boost from INSAT

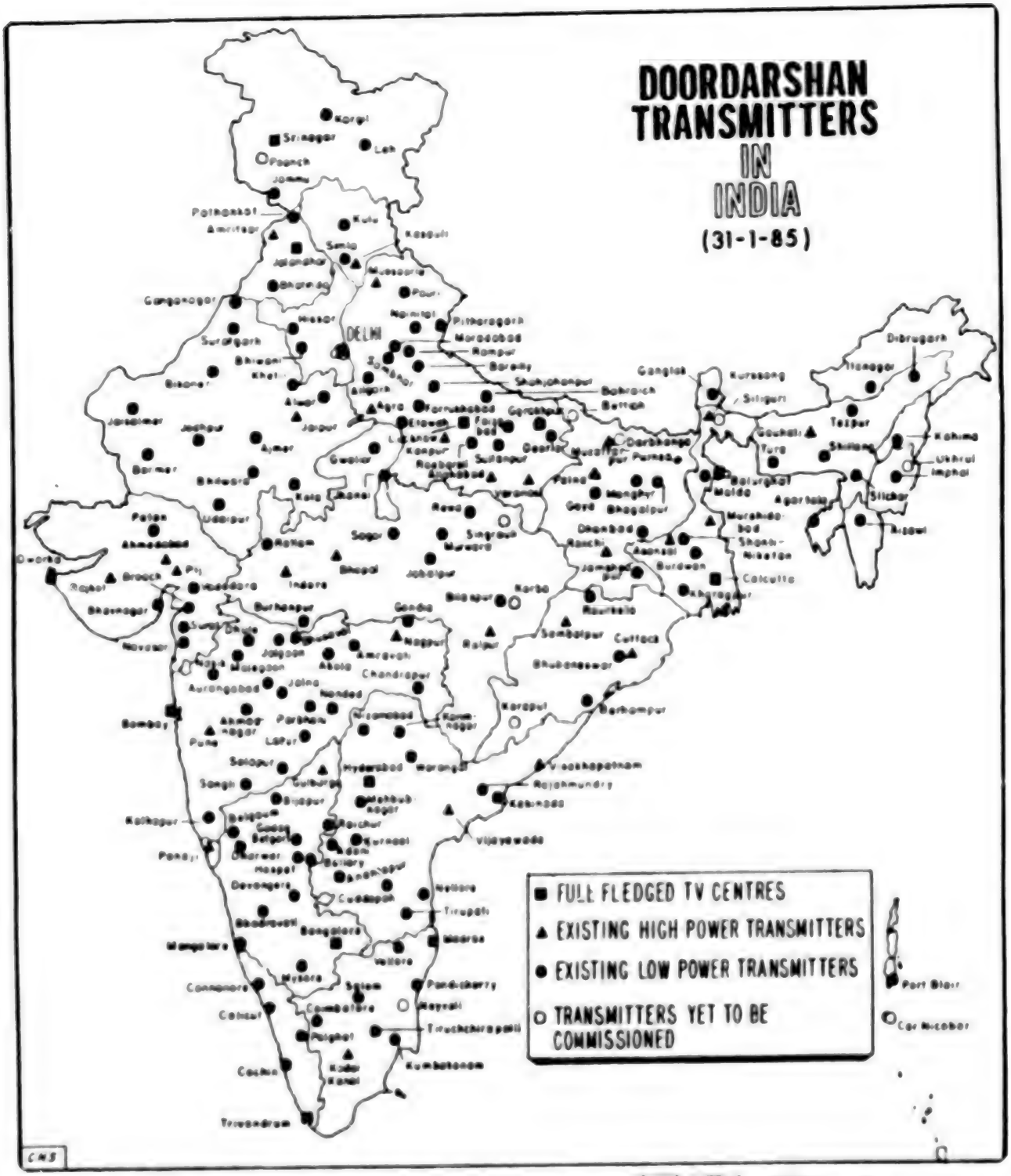
When this plan was finalised, the Doordarshan authorities would have hardly imagined the extent of boost television would get in the Plan period as a result of successive events like the launching of the domestic satellite (INSAT), the holding of the Ninth Asian Games (Asiad), the Non Aligned Summit (NAM) and Commonwealth Heads of Government Meeting (CHOGM) in Delhi and the deliberate policy decision of the Central Government to make the optimum use of the mass media for the Lok Sabha elections

The launching of INSAT led to the formulation of a special scheme for television expansion at an estimated outlay of Rs 40 crores This envisaged provision of 10 kW transmitters with limited programme facilities at Ranchi, Rajkot, Gorakhpur and Nagpur and provision of 2,000 direct reception sets in the villages of Andhra Pradesh, Orissa, Maharashtra, Bihar, Gujarat and Uttar Pradesh

The Asiad gave added impetus to television expansion as the Government decided to introduce colour and have live coverage on a national hook up by linking various centres through satellite and microwave links The programme got fillip during NAM and CHOGM The impact of this was seen in the growing demand for extending television coverage from areas where there was little or no service at all In response to these, low power transmitters were commissioned in 20 towns in November 1982 as a pilot project on the eve of the Asiad

Crash programme

The popularity of these 20 centres dispersed over all the regions, made the Government go in for a massive expansion to cover 70 per cent of the population by the end of the Plan as compared to 25 per cent in 1980 This involved a tenfold increase in the number of transmitters to 180 Two



special plans were approved to achieve this—one with an estimated outlay of Rs 68 crores for the country as a whole and another with an outlay of Rs 36 crores for the North-East Region

The Rs 68 crore plan envisaged provision of television service to all important big towns with special emphasis on border and strategic areas Under this plan, 13 high power and 118 low power transmitters were to be set up The North-east plan envisaged setting up of three 10 kW transmitters at Silchar, Dibrugarh and Tura five one kW transmitters at Shillong, Kohima, Imphal, Itanagar and Aizawl and six low power transmitters

A significant feature of the implementation of these plans has been the increasing reliance placed on indigenous sources for equipment. The transmitters had been supplied by the two public sector firms Bharat Electronics Limited and Gujarat Communication and Electronics Limited—whereas the TVROs (receive only) including dish antenna and the electronics to receive signals from the satellite were supplied by Bharat Electronics Limited and Electronics Corporation of India Limited. These firms have foreign collaboration to make the equipment. The massive requirement of this programme has helped development of low power transmitters and TVROs for the first time in the country. Each high power transmitter cost Rs 2.7 crores and each LPT about Rs 21 lakhs. The steel towers were procured from another public sector undertaking, Triveni Structurals Limited, which was also entrusted with their erection.

Among these different programmes, the one envisaging installation of community viewing sets in villages as part of the utilisation of INSAT has been lagging in implementation. Against the targeted 2,000 VHF and an equal number of direct reception community TV sets, only 220 and 795 have been set up by the end of December 1984. On the other hand, the special TV expansion plan had an impressive record of implementation. Unlike in several other projects of the Government, the supplies of equipment and erection of towers were so coordinated that between July and October 1984 expansion took place at the rate of one transmitter a day. In some cases, even two were commissioned in a day. When the Sixth Plan ends, the number of HPT will increase to 47 and that of LPT to 133, making the target total of 180. At that level the coverage of population will be 70 per cent.

Three-tier service

In the light of the experience gained the emphasis in the Seventh Plan is proposed to be laid on strengthening the facilities for software. There is a justifiable feeling that the mass media will cease to have attraction in the long run if the programmes were to continue to be Delhi-based and Hindi-based. Therefore, in the Seventh Plan, it has been proposed to have a three-tier—primary, national and local—service to meet the diverse software objectives. At the primary level, each major State will have its own service in the State language. At the national level, there will be an additional service with Delhi as the main production centre but utilising the programmes prepared in other centres. Besides this, in all relay transmitter centres, programme production facilities will be created to give local colour to the programmes telecast. The third tier, "local service", will be put out for a limited period every day on the primary service transmitter. In metropolitan centres, there will be a separate service to put out multilingual programmes to cater to the varied tastes of viewers.

This will call for augmentation of the software facilities. For this, studio centres are to be set up in the capitals of six States—Madhya Pradesh, Bihar, Orissa, Himachal Pradesh, Haryana and Tripura—and additional studio centres in 18 towns: Vijayawada, Madurai, Cochin, Allahabad, Dehradun, Agra, Jabalpur, Surat, Jammu, Mysore, Nagpur, Pune, Jodhpur, Darbanga, Shantiniketan, Rajkot, Sambalpur and Chandigarh. For the second channel, an additional studio will be provided at four centres.

So far as the hardware is concerned, the proposals include setting up of "primary service" relay transmitters at 57 centres, broad service transmitters at seven centres, low power transmitters at 68 places and transmitters to rebroadcast national service at 10 centres. When this programme is implemented, 85 per cent of the population is expected to have access to television by the end of the Seventh Plan.

CSO: 5550/0081

RADIO LINK INSTALLED AT ANTARCTIC BASE

Bombay THE TIMES OF INDIA in English 29 Mar 85 p 7

[Text]

BOMBAY, March 28.

INDIA would be now able to save $40,000 by commissioning a high frequency radio communication link between the Indian base camp, Dakshin Gangotri, at Antarctica and New Delhi.

The Rs. 20 lakh-7,500 kg. equipment was installed and commissioned by Punjab Wireless Systems Limited (Punwire) a state government undertaking, for the Indian Navy. The first contact with India from Dakshin Gangotri was made on January 23 — a distance of 14,672 kilometres. Trials continued thereafter and regular messages started flowing from February 2. The equipment was formally handed over to the naval communication officers on February 23, 1985.

One major advantage of equipping the Indian base camp with this equipment is that it would reduce our dependance on the INSAT IB satelhte which had to operate via International Maritime Satellite, the cost of which was Rs. 120 per minute.

In an informal talk with reporters Mr. G. Kumar, Punwire's system's manager, who accompanied the fourth expedition and set up the equipments said that four different types of aerials were installed to cater to communication with India and other stations at Antarctica. The transmitter was unloaded from the ship and lifted to the base camp by MI-8 helicopters. Antenna parts were transported using pistion-bully vehicle, the entire process of which took five days.

MANUAL LABOUR

From the time the equipment was off loaded, Mr. Kumar said that he worked on an average 18 hours a day which included manual labour of cutting snow to the dept. of two meters, burying wooden logs weighing 100 kg. each and lifting metalic masts.

The first phase of completing the outdoor job was done on schedule. To avoid any major assembly work on the ice at the base camp, sections of the antenna masts were pitted on the ship's hold as the team began to approach the ice shelf.

Mr. Kumar said that prior to the commissioning of the equipment, the team members could communicate with India only for three minutes through the satellite. Now, they were in constant touch with the special Antarctica control room in the department of ocean development in New Delhi through morse code.

Plans are also underway to introduce a voice communication link between India and Dakshin Gangotri, he said. Punwire has also proposed to the department of ocean development that from the next expedition there should also be a telex link and fascmile facilities.

One of the chief aims of the fourth expedition was to explore the best possible routes to the South Pole. Mr. Kumar said that some of the team members had gone 120 kilometres from Dakshin Gangotri. During the next expedition, they would progress a little further towards the pole, and if possible, would even try to land there.

However, during the present expedition, the team members did have an opportunity ot speak to the Americans who were manning the Amundsen-Scott station at the South Pole. The distance between Dakshin Gangotri and the pole was nearly 2,000 kilometres. It may be recalled that the decision to send an Indian to South Pole was one of the last papers signed by the late Prime Minister, Mrs. Indira Gandhi.

Trials in communication were also carried out from the ship and link was established with radio amateurs in India and other countries for about a fortnight. Two members of the team also talked to their families from the ship.

Mr. Kumar did not rule out the possibility of linking the Indian base camp with a regular telephone link with India. Attempts would also be made to give a live experience to Indian television viewers about the activities of Indian scientists in the Antarctica.

About having an air link, he said that India might tie up with Argentina, the country closest to the Antarctica, on this project.

Mr. B. D. Khurana, Punwire's managing director, was also present 30 and 50 pane from Monday.

CSO: 5550/0071

BRIEFS

TELEVISION RECEPTION PROBLEMS--Darjeeling, April 3--Telecasts through the Kurseong relay centre have been switched to Channel 8. Since its inception two months ago, Kurseong had been linked to the same channel as Bangladesh television, which has a centre stationed nearby at Rangpur. Viewers in North Bengal were not receiving clear telecasts from either of the stations which created widespread discontent. However, viewers complain that even after the change in channels the telecast is not very clear. They attribute it to low voltage. The Kurseong centre, which currently has a one-kilowatt transmitter, is being upgraded to 10-kilowatt transmission. The new transmitter will become operational in July. Kurseong is one of the 139 transmission centres in the country including nine in West Bengal that were sanctioned under the special expansion plan in 1983/84. The plan was undertaken by the Centre with an eye to the elections. [Text] [Calcutta THE TELEGRAPH in English 4 Apr 85 p 4]

BOMBAY DIGITAL EXCHANGE--Bombay, April 11--A digital electronic exchange was commissioned here on Wednesday. This equipment represents the latest in the digital telephone technology and employs digital signals similar to the signals used inside a digital computer. The subscriber's equipment is micro-process-or-controlled and has all the advantages of electronic switching without any moving parts. Clarity of speech and immunity from noise is a distinct advantage apart from the small space required for installing the exchange equipment. [Text] [Madras THE HINDU in English 11 Apr 85 p 7]

PRIVATE AUTOMATIC EXCHANGES--New Delhi, April 17 (PTI)--Telephone subscribers now may have their own private automatic branch exchanges. Indian Telephone Industries Ltd fills the bill with a unique micro-processor controlled electronic private automatic branch exchange, which will shortly be manufactured under a collaboration being finalised by the department of electronics. The EPABX will be available in various capacities from 25 to 1,600 lines with special features such as practically unattended operation, dialling facility to dispense with operators, low cost and low power. The EPABX will meet the varied needs of the subscribers. [Text] [Bombay THE TIMES OF INDIA in English 18 Apr 85 p 7]

INDO-SOVIET RADIO, TV COOPERATION--New Delhi--India and the Soviet Union have signed a protocol on exchange of television and radio programmes. The agreement, among other things, also provides for exchange of visits of experts in these fields. The protocol was signed by the Information Minister, Mr V.N. Gadgil, and Chairman of the Soviet State Committee for Television and Radio Broadcasting. Radio and TV programmes which reflect the rich cultures of the two countries and the various aspects of the lives of their peoples, their friendship and the progress achieved by them will be exchanged, according to the protocol.--UNI [Text] [Madras THE HINDU in English 31 Mar 85 p 4]

CSO: 5550/0072

BRIEFS

T.V. TRANSMITTER OPERATION--Chah Bahar, Sistan-Baluchestan Province, 28 April, IRNA--The first television transmitter for Nikshahr District in Chah Bahar started operation Sunday. The 10-watt [as received] transmitter, for the installation of which 10 million rials (dlrs 107,526) has been spent, enables residents of the area to receive programs to the nationwide T.V. network. [Text] [Tehran IRNA in English 1500 GMT 28 Apr 85 LD]

TELEPHONE EXCHANGE INAUGURATED--The automatic 3,000-subscriber communication exchange in Golpayegan was inaugurated this morning in the presence of the minister of post, telegraph and telephone. This telephone exchange, capable of being expanded to encompass 10,000 subscribers, comprises over 1 billion rials worth of equipment and the inhabitants paid 60 million rials of its construction cost. With the inauguration of this exchange center and its 12 intercity canals, considerable facilities are provided for telecommunication between Golpayegan and other parts of the country. It is worth noting that this center's intercity station switchboard was made in Iran, whereas it previously used to be imported from abroad. The cost of manufacturing this unit in Iran is half that of imported types. [Text] [Tehran Domestic Service in Persian 1630 GMT 25 Apr 85 LD] Mr Morteza Nabavi, minister for posts, telegraph, and telephones, opened the automatic 3,000-subscriber phone system in Golpayegan District and announced that in continuing the government's policy of greater attention to deprived areas, more than 120 cities of the Islamic country have automatic telephone centers. He added: Considering that before the revolution only 60 cities had an automatic telecommunications system, this figure is of special signif'cance. He said that in the past year, about 400 villages throughout the country have joined the country's telephone network. In 1977, only 30 villages had telephone facilities. He added: Circumstances are such that greater facilities are available and foreign experts [services] were used extensively. [Excerpts] [Tehran Domestic Service in Persian 0430 GMT 26 Apr 85 GF]

TELEVISION STATION OPENED--A television station at Nikshahr in the Chahbahar area of Sistan va Baluchistan, with a transmitter of 10 watts and a radiation capacity of 400 watts, was opened and officially became operational. According to the Central News Unit, with the opening of this television station, which was completed with the efforts of the employees of the Voice and Vision of the Islamic Republic of Iran, Zahedan center, the residents of Nikshahr and neighboring districts will be able to view the network number one programs on channel 10. [Summary] [Tehran Domestic Service in Persian 0430 GMT 26 Apr 85 GF]

IRAQ

[illegible] IN TELECOMMUNICATIONS PLANNED

[illegible] Arab Satellite System

London AL-HAYAT in Arabic No 344, [illegible] pp 24-25

[Interview with Minister of Transport and Communications 'Abd-al-Jabbar 'Abd-al-Rahim, by 'Adil-al-Awsat al-Sayyid: date and place not specified: "The Arab Satellite Is Almost Ready"]

[Text] On the subject of the use of technological achievements to shorten distances, AL-HAYAT held an interview with Mr. 'Abd-al-Jabbar 'Abd-al-Rahim, the Minister of Transport and Communications, in which he discussed transport and communications between the Iraqis and the rest of the world, with current attacks on Iraq, in view of the fact that it has been at war for the last 4 years.

[Text] Q: What news is there about the Arab satellite, and how important is it as an advanced means of communication for Iraq, to break away from the [illegible] of the world?

[Question] What impact will the Arab satellite have on wire, wireless and telephone communications, and the dissemniation of Arab information? When will it be launched?

[Answer] The Arab satellite is the ideal way to link the Arab countries with a telephone and telegraph communications system and provide services for relaying and sharing television and radio programs among the Arabs. It is particularly important for linking distant Arab nations which are not linked by land or sea, such as, for example, the Sudan with Iraq, Kuwait with Morocco, or Qatar with Mauritania.

Currently, such communication is difficult, or has to be routed through foreign countries. A person in the eastern part of the Arab world can talk with someone in the western part only by going through a European country. The Arabs thus have to pay the intermediary countries, and moreover, the operation is complicated, although the quality of the conversation is not as good as would be expected. The satellite will make inter-Arab communication simple, and obviate the need for foreign services. Telephone traffic has been calculated, and we have taken into consideration its growth over the next 10 years. The design of the Arab satellite takes into consideration the growth of telephone traffic for several years. In other words, it was designed as a permanent, not a temporary solution. Any Arab citizen will be able to receive any program from any Arab television station, and rebroadcast it from his television station simply by completing a bilateral agreement between the two countries. It will also be possible to broadcast Arab programs produced by the Arab League to Arab countries which desire it, particularly programs which deal with Arab history, events and newsmakers. The satellite can also be used to link distant villages, replacing microwave systems which are expensive and difficult to maintain. The Arab satellite will provide the rural parts of the Arab world with the same necessities for development as are available in the cities.

The Arab satellite system will consist of three satellites. The first and second will certainly be launched in 1985. The third is a backup in the event that one of the other two should fail, in which case it will replace the failed satellite.

In accordance with a decision by the Arab Space Communications Authority which has its headquarters in Riyad, the first satellite will be launched in February 1985 along with a Brazilian satellite on the Ariane rocket.

[Question] What is the relation between the Arab satellite and the Brazilian satellite?

[Answer] There is no relation at all between the two satellites. The Ariane rocket is capable of launching two satellites, and the agreement that was reached with the Ariane Company was that the Arab and Brazilian satellites would be launched by the same rocket simultaneously. The Arab and Brazilian satellites will each be launched into its predetermined orbit.

[Question] What will the orbit of the Arab satellite be?

[Answer] The orbit of the first will be 25 degrees east of the equator and that of the second 15 degrees east of the equator. The orbit will be at a height of 36,000 km above the earth. The speed will be the same as the rotation of the earth so that the satellite will remain fixed above the surface of the earth, revolving around it at the same speed that the earth is rotating.

The second Arab satellite will be launched by the U.S. space shuttle [Challenger?]. The second launching is scheduled for [month name garbled], 1985. With the successful launching of the two satellites the Arab satellite system will be completed, and all parts of the Arab World will be covered for service.

[Question] What will be the impact of the satellite on communications in Europe, America and other foreign countries?

[Answer] Arab communications currently are carried out through the international communications system and by ground communications using coaxial cables. When the Arab satellite is launched communications with other nations will improve because the workload for other satellites will be reduced, leaving certain channels unused, and communications with Europe, America and Japan will improve.

[Question] Will the Arab satellite provide the Arabs with hard currency?

[Answer] It will certainly provide the Arabs with hard currency, especially for satellites which are contacted through European countries, of which there are many. The country that acts as the third party gets one third of the tariff charged in that country in hard currency. The Arab satellite will provide the Arabs with millions of dollars and other hard currencies without the need for third parties. The project cost approximately $300 million. There are two control stations. The first, which is in Riyad, Saudi Arabia, is responsible for all aspects of observation and monitoring. This station is ready for operation. The secondary station, which is under construction, will be located in Tunis. It will be a backup for the Riyad station, to which it is linked by communications lines. The computers which control the two stations are located there. It is a part of a network of ground stations. In order to make use of the satellite the Arab countries must set up stations in their countries.

It is heartening that most Arab countries have agreed to do that. The first Arab country to have completed its ground station is Bahrain. In 1985 all of the Arab stations will be set up one after the other, thereby establishing a system of satellites and ground stations, providing the Arab people with tangible modern services. All of the Arab countries are members of the Arabsat organization.

[Question] Will there be any effect on the way information is exchanged between Arab countries?

[Answer] Any Arab country can broadcast whatever programs it likes and can receive the broadcast of any station as long as there is a bilateral agreement between two Arab countries. It will not be possible [for the public] to pick up the radio or television broadcasts directly; they must be rebroadcast by the concerned country. Each Arab country will determine which programs it will rebroadcast in accordance with its own policies on the dissemination of information.

[Question] There are reports that Israel will launch a satellite to disrupt the Arab satellite. What information do you have about this, and to what extent could an Israeli satellite interfere with the Arab satellite?

[Answer] As usual, the Zionist entity is trying to thwart this great project which will bring the Arabs closer together, just as it attempts to prevent all joint Arab projects, particularly those involving the transfer of advanced technology. Just as the Zionist entity bombed the Iraqi nuclear reactor in 1981, it will attempt to thwart this project. U.S. companies are financing the Israeli satellite before it is launched. But all international bodies and the Intelsat international federation firmly believe that the area occupied by the Zionist entity does not need a satellite. An international campaign is underway to prevent the Zionist entity from launching its satellite, which would confuse [the Arab satellite]. Technically, there is no need to launch it because it would interfere with the communications channels allocated by international convention to the Arabs, and furthermore, Israel does not need it as a basis for communications within its geographic area.

[Question] What must be done if Israel insists on launching its satellite?

[Answer] Israel's behavior in space is the same as its behavior on earth. It does not obey the orders of international bodies or of the United Nations. The Zionist entity can be expected to use its satellite to spy on the Arabs. The Zionist satellite is called A.M.O.S.

According to the technical studies which were prepared for Jordan, Syria, Iraq, part of Saudi Arabia and Egypt the interference will be handled through the international federation in its capacity as the organization responsible for allocating frequencies to the [broadcasting] authorities which want to launch satellites. Discussions with the international federation are underway for the purpose of [finding a way] to reduce the interference of the Zionist satellite on the Arab satellite system technically. The one who is there first is the one who has priority, and the Arabs were the first to allocate the frequencies and the band. By law the Zionist entity must alter the specifications of its satellite so that it does not interfere with the Arab satellites. As long as it is not committed to international laws it can interfere with the Arab satellite communications system.

[Question] Can the Zionist entity use the Arab satellite if it does not launch its own?

[Answer] No. But it can receive all the Arabic programs which it broadcasts, and technically it can steal the programs. Steps will be taken internationally to maintain the effectiveness of the Arab satellite because it is a contributory factor in bringing the Arabs closer together and breaking psychological barriers. For this reason we think Israel is feeling uneasy about the Arab satellite. It will also facilitate contacts between Arab citizens and it will be a contributory factor in development and in the transfer of advanced technology in the Arab World.

[Question] Will [the Arab satellite] cover foreign countries which are adjacent to the Arab world, such as Iran, Turkey and Cyprus?

[Answer] These foreign countries, in addition to southern Italy and Greece, will be covered. Iran, and other countries under the satellite's orbit --including part of Africa--can view the programs which are broadcast if they set up a special station.

I want to add here that Saudi Arabia has been entrusted by all the Arabs to coordinate the effort within the international federation to prevent the Zionist entity from launching its own satellite.

According to Zionist announcements, the Zionist satellite is scheduled for launching in 1987.

9123
CSO: 5500/4505

TELECOMMUNICATIONS SERVICES FOR VARIOUS CITIES PLANNED

Katmandu THE RISING NEPAL in English 17 Apr 85 p 3

[Text] Nepalganj (RSS)--Telecommunications service through digital microwave system will be provided to thirty places of the Kingdom within the coming 2 years, it is learnt.

After the provision of this systems trunk service within the country and abroad will also be provided to the people of these places and an indicator of trunk call could also be fixed within the customers' telephone sets.

According to local telecommunication office the Government of Finland is to provide technical assistance and necessary equipment for this purpose.

Telecommunications technicians from Nepal and Finland have been carrying out a survey in this connection.

According to the technicians concerned, terminals will be installed at Nepalganj, Surkhet, Mahendranagar and Dhangadhi of this region and repeater stations will be commissioned.

Other terminals and repeater stations will be commissioned in districts east of Nepalganj, according to the source concerned.

CSO: 5500/4735

BRIEFS

AIR TRAFFIC COMMUNICATIONS PROJECT--An air communications project that will link air traffic between seven Indian Ocean countries was officially inaugurated today in Mogadishu. The project, which commenced operations today, will link air traffic communications between Somalia, Kenya, Tanzania, Madagascar, Seychelles, Comoros Islands, and Mauritius. The project, which cost 12 million francs, was financed by the EEC and construction work was carried out by a French company. [Excerpt] [Mogadishu Domestic Service in Somali 1115 GMT 1 May 85 EA]

CSO: 5500/138

SOUTH AFRICA

BOTHA DISCUSSES SUBSCRIPTION TV, SABC FEES

MB260700 Johannesburg Domestic Service in English 1700 GMT 25 Apr 85

[Text] The concession for subscription television is to be granted to a consortium of the largest newspaper groups in South Africa. The announcement was made in the House of Assembly this afternoon by the minister of foreign affairs, Mr Pik Botha, during the debate on his budget vote. He said the press consortium consisted of the Argus Group, PERSKOR, South African Associated Newspapers, NASIOLALE PERS, THE NATAL WITNESS, and THE DAILY DISPATCH.

Our parliamentary news staff reports that the press groups on their own initiative have already entered a shareholders agreement and have decided on how the shares will be divided and managed.

In his reference to the task group which was appointed to investigate the introduction of subscription television, Mr Botha said the group has considered more than 40 applications for shares. However, the group had recommended that a consortium of press groups have a controlling share and the minority shares should be granted to an entertainment consortium. In the light of comments from the Competitions Board on the granting of shares to groups within the entertainment world that the composition of the entertainment consortium appeared to be completely arbitrary and that important groups would be excluded, the government had decided to give the concession to the press consortium alone.

In his response the director general of the SABO, Mr Riaan Eksteen said if the press group consortium approached the SABC for assistance the SABC will consider it favorably.

With regard to an increase in SABC licence fees, Mr Botha said that if an increase was approved it would be lower than the inflation rate. He said he was considering widening the scope of concessionary licenses, which cost 24 rand a year, to include all people above 70 years of age. These licenses would be issued only on request. Mr Botha gave the assurance that there was no intention of raising concessionary license fees.

Mr Botha pointed out that the SABC was dependent on advertising for nearly 64 percent of its income, and on license of its income from investments, but it was expected that 90 million rand from accumulated funds will have to be used in the coming financial year for capital projects. He said this could

lead to a considerable drop in interest on revenues resulting in greater pressure being placed on the other two sources of income, namely advertising and license fees.

The minister said that in view of this, serious consideration will have to be given to a request from the SABC for an increase in license fees. He said the government expected the SABC, in the interests of the variety of language groups, to supply services which could be offered only at a considerable loss. Therefore, unless the SABC was able to compensate those losses out of advertising income, license fees will have to be increased considerably. This would result in fewer people being able to afford television, something that the government wanted to avoid.

CSO: 5500/136

SOUTH AFRICA

SABC TO INTRODUCE TELETEXT SYSTEM 1 NOV

MB071215 Johannesburg Domestic Service in English 1115 GMT 7 May 85

[Text] The SABC is to introduce a new broadcast service that will deliver news and information to domestic television screens in text form. The new service was announced by the director general of the SABC, Mr Eksteen, who said the target date for a pilot service in the Witwatersrand and Pretoria areas would begin on 1 November.

The new service is of a kind known technically as Teletext, of which the SABC's version will be called teledata. Television viewers whose sets are fitted with the necessary decoder will be able to call up a chosen page from a menu offering a variety of material, including advertisements. There will be no sound track.

However, even viewers without a decoder will be able to receive teledata pages in the form of a moving scroll. Mr Eksteen said Teledata broadcasts would make use of spare capacity in the existing TV 1 signal and would be a [word indistinct] service to the viewer. Television manufacturers were incorporating decoders into the new generation of television sets about to be manufactured.

Mr Eksteen emphasized that Teledata would not compete in any way with the Post Office's Beltel System, which belonged to a technically different media family. Teledata would also not seek the same kind of advertising as did the press, since it was a new media quite distant from existing ones. Teledata's range of technical facilities include giving viewers the option of projection urgent news flashes into television programs, extra large text for people with impaired vision, and subtitling of certain news bulletins for the benefit of the deaf.

CSO: 5500/140

MULDER FEAR OF SABC ANTI-WHITE CONSPIRACY NOTED

Johannesburg CITY PRESS in English 31 Mar 85 p 7

[Article by Percy Qoboza: "The SABC Wants To Keep Us All in the Bush Era...Ask Stevie Wonder!"]

[Text]

DON'T be fooled by the smile on his face — Connie Mulder is an angry old man.

It seems he has been doing his arithmetic and has come up with some stunning conclusions.

He believes a terrible conspiracy is going around the dark alleys of the SABC headquarters, threatening the very soul and existence of the white man.

No amount of arguments can convince him this is not so.

Why, he points out, would the SABC show such evil monstrosities as The A Team on the box?

As he sees it, The A-Team are not only a bunch of rascals in the mould of the Four Just Men, but the show goes further than that.

It has an enormously black gut called Mr T.

This is the centre of Connie's anger.

Mr T is portrayed as a hero who bashes white men's skulls and who shows more ingenuity than his white colleagues when it comes to getting out of tight spots.

Surely civilization was designed so that only white people — because of their superior rating — should occupy the position of heroes?

So why does the SABC portray blacks as heroes?

Simple, says Connie. This is a deliberate process to condition whites to the Government's hidden agenda of handing over the country to the blacks.

It's all a plot to make whites accept the ever-increasing integration which has seen blacks mobbing whites out of their lily-white preserves.

But Mr T is not the only guy driving Connie up the wall.

What, he says, about some of the films shown by the SABC which show black policemen in charge of towns and cities?

These are shown pushing "white people around".

This, in his view, contradicts the whole South African way of life.

Cultural pride and the retention of ethnic identity, according to Connie's reasoning, can only be protected if we ensure that black policemen do not push whites around.

White law and order must be firmly in the hands of white law and order enforcement agencies.

We must never have a situation where a black policeman in Bloemfontein stops a white motorist and demands to see his driver's license. That would be an insult.

Maybe the SABC, I suggest, could now stop shooting Shaka and spend that money making up a brilliant movie about the history of the Klu Klux Klan.

That would appear quite attractive to the lower rungs of the Conservative Party.

In fact, I am quite certain that the SABC would find that financial support for such a venture would be forthcoming with unprecedented enthusiasm.

But then, it must also be gratifying to know that Connie DOES watch The A-Team. Otherwise why would he be such an authority about the intentions behind its screening?

Or maybe the SABC could consider screening the tear-jerker series Roots. Now that would really make the HNP very happy.

It would be a welcomed sentimental journey to the good old days when "kaffirs were kaffirs" and "base were base".

But then, the SABC is a strange creature.

Recently a very talented young man on its staff was forced to resign from that lot.

Being talented and ambitious, he applied for the Nieman Fellowship at Harvard University.

- The program enables the successful candidate to study for a year at that prestigious institution to hopefully assist in broadening his intellectual horizons while instilling leadership qualities that would help the cause of a free Press in society.

This year, the program celebrates 25 years in South Africa and the majority of Nieman fellows control most of the major newspapers.

To date, nobody has been able to take up that opportunity in the SABC — probably because they swallowed hook, line and sinker the defamatory assertions in a daily newspaper — born out of sin and the theft of public monies — that the Nieman Fellowship was an insidious invention of the Central Intelligence Agency, designed to seduce pure South Africans and transform them into flaming liberals intent on overthrowing the order in the land.

What arrant nonsense.

All the SABC is doing is making sure that television and radio stations in this country remain in the bush era, perpetrating images best left to the era of Adam and Eve.

Ask Stevie Wonder.

CSO: 5500/137

INDIANS GET RAW DEAL ON TV, MINISTER CLAIMS

Johannesburg THE CITIZEN in English 25 Apr 85 p 4

[Text]

HOUSE OF DELEGATES. — The SABC was not playing its role properly to bring South Africa's various population groups together, Mr Ahmed Arbee (Sol Eastern Transvaal), said in the House.

Speaking in the committee stage of the Foreign Affairs Vote of the Budget, he said in many ways South Africans were strangers to each other and the television services were missing a golden opportunity to help cement the gap.

Children's programmes on TV should be restructured to include children from all population groups as it was essential that they should be seen together without political conotation.

Existing programmes, he said, were one-sided and did not serve this purpose as they featured only White children.

Mr Arbee said he was not pleading for another ethnic TV channel to be created for Indians, but what he was asking for was objective coverage on television on all issues including discussions in parliament.

The SABC, he said, had a monopoly of the service but yet it was strange that it was running at a loss.

Mr Amichand Rajbansi, the House's Chief Minister, said the time had come for more Indian cultural artists to be featured on television.

Radio programmes serving Indian interests should be broadcast nationally to reach Indian radio listeners in all parts of the country, he said.

The Minister of Own Affairs, Education and Culture, Mr Kassie Ramduth, said Indians were getting a "raw deal" on TV and he appealed to the Minister of Foreign Affairs, Mr Pik Botha, who controlled TV and radio, to put matters right.

Indians emerged from a rich cultural heritage and they wanted to maintain that heritage even in a mixed society such as South Africa's, he said

CSO: 5500/137

PRESS CONSORTIUM GETS CABLE TV LICENSE

Johannesburg THE CITIZEN in English 26 Apr 85 p 8

[Article by Tony Stirling]

[Text]

THE newspaper consortium which has been awarded the licence to launch subscription television in South Africa presented a strong case to the Cabinet task-group that decided in its favour in the face of numerous competitors.

Cardinal to the consortium's submissions were its arguments on which of the many applicants could, in the long term, best serve the South African community and which was best equipped to render the new service.

Formation of the consortium has brought together five English and Afrikaans newspaper groups which in the operation of newspapers controlled by them represent a spectrum of diverse political views in South Africa. Between them, they publish all the daily newspapers in South Africa.

These groups are The Argus, Nasionale Pers, Perskor, SAAN, the Daily Despatch, and the Natal Witness. The latter two are the smallest members of the consortium and own regional daily newspapers.

The other four are the giants of the South African newspaper industry, while the two Afrikaans orientated companies, Perskor and Nasionale Pers, also control big publishing empires.

Point

The first major point the consortium made in its submissions was that in the face of declining profitability of newspapers — since SABC-TV went commercial in 1978, only two Afrikaans newspapers, Die Burger and Rapport, remained profitable.

The position of English-language newspapers was marginally better.

Unless the privately-owned media gained access to the new generation of electronic communication media, there would be a disturbing shift in the media industry in South Africa.

Unlike many other parts of the world, the newspapers in South Africa were neither directly nor indirectly subsidized and unless special measures were taken to keep opinion-forming newspapers alive, the country's access to a healthy, free Press would soon vanish.

"In reality we would then enter the electronic age with a media structure comparable to that of a communist state — with one monolithic State organ in a dominant position — and differ entirely from the pluralistic media structures which characterise Western democracies," the consortium submitted.

Two assurances essentially defining the nature of subscription television were given to the Government.

Firstly, it would primarily render what was envisaged as a family service, and would not support unacceptable practices such as pornography and gambling, nor would it propagate extremist viewpoint and lifestyles and the like.

And, although the precise nature of the service would have to be determined at a later stage, it was accepted that subscription television would operate under the same bars as TV 4, in that it would not broadcast news, nor material with a political emphasis. But its service would include all other types of programmes, including sport, and advertisements.

The consortium argued that in other parts of the world such as the United States, the Press groups had taken the lead in the creation of subscription television systems.

The media companies were clearly in a position to make the transition from one media to another, while there were few outsiders who had the background in media management to operate successfully in such a field.

With combined assets totalling R635 million and turnover of R1 196 million, the consortium members, who had agreed to finance subscription television by way of share capital,

loans, including guaranteed external loans if necessary, had the financial muscle to tackle the multi-million rand project.

Electronics

By virtue of the fact that sophisticated electronics was to an ever-increasing degree being used in the production of newspapers, the consortium already had the special technical skills needed to manage the complex equipment that would be used in the proposed service, and the necessary skilled personnel was also available.

The newspaper groups, the youngest of which had been operating for 55 years, were in a unique position to determine and give expression to the particular ethical and moral norms of the community, and was thus the most qualified group to run the new service to the advantage of the South African community.

Because it was the universal practice of the big overseas film producers to reserve for themselves the rights to screen their films on subscription and transmission television, the new service would be able to negotiate direct with each overseas film distributor — and no local film distributor was relevant in this process.

It was also pointed out that the creation of the new service would open opportunities to a wide variety of local industries and services.

These ranged from the production of local films and video material, with all that went into their making and distribution, to the use of transmission and other services of the SABC.

In so far as other applicants were concerned, particularly those from the film and video industries, the consortium submitted that various aspects involved in the running of these businesses was not particularly relevant to the management of a mass medium.

Video

The video industry in South Africa had already been placed at an advantage by the creation of SABC-TV, as without it, there would be far less TV sets in homes and the industry would consequently not have blossomed as it had.

Neither was there any compelling reason to justify protection of the cinema industry in South Africa.

Relating to the application of one particular "conglomerate" in the film and video industry, Satbel, the newspaper consortium said it already controlled most of the cinemas in South Africa, had interests in video distribution and extensive film and video production facilities.

Control

If it was in any way involved in the ownership or control of subscription TV, this would lead to the creation of an unacceptable, monolithic industry structure across the spectrum of film and video-making and distribution in South Africa.

It would give Satbel a stranglehold over the entire industry, and vertical integration of this kind was worldwide regarded as a monopolistic disorder.

Satbel, as a single private company, could for understandable reasons not be given a share in the new service, unless its smaller colleagues were also involved.

Because of the highly fragmentated nature of the other industries and cinema owners — involving several hundred instances and individuals — it was difficult to see how each one of these entities could get a share in a single service.

Satbel's spokesman said yesterday that the company wished to get more details of the award of the licence to the newspaper consortium before commenting.

CSO: 5500/137

NORWAY TO PROVIDE ELEVEN MICROWAVE RELAY STATIONS

Dar es Salaam DAILY NEWS in English 23 Mar 85 p 1

[Text]

TANZANIA and Malawi are today expected to sign contract for the establishment of a microwave telecommunication link between the towns of Mzuzu in Malawi and Mbeya in Tanzania.

A statement issued in Dar es Salaam yesterday by the Tanzania Posts and Telecommunications Corporation (TPTC) said the 110m/- contact would be awarded to a Norwegian firm, Messrs. E.B. Nera, who will construct eleven relay stations and two cable routes between the two towns.

The project is part of the Pan-African Telecommunications (PANAFTEL) network, accommodating both regional and international traffic It will provide direct communication link from Tanzania's network to Blantyre and other Malawi towns, with a future possibility of direct link to Mozambique and Zimbabwe when the Malawi PANAFTEL projects linking the two countries are completed.

According to the statement, the digital microwave radio project would be financed jointly by the Swedish International Development Authority (SIDA) and the Norwegian Agency for Development (NORAD).

The statement said the digital transmission equipment to be used in the link would be the first of its kind in Malawi and Tanzania as it will embody latest technology in digital techniques.

"The completion of this link in the next two years will mark yet another step forward in the fulfilment of the Organisation of African Unity (OAU) desire to establish a Pan-African Telecommunication network knitting the whole continent, thus enabling member States to communicate directly without routing their traffic via foreign countries abroad".

Reviewing the country's efforts to develop her communications links with other African countries, the statement said the north-south system was already linking Tanzania with Zambia, Kenya and Ethiopia.

It said Arusha, Dodoma, Iringa and Mbeya had benefited from this project and TPTC was making efforts to commission the east-west portion of the PANAFTEL microwave system so that Singida, Tabora, Shinyanga and Mwanza would also benefit.

"Right now TPTC is in the process extending the east-west project from Mwanza to Bukoba and Kigoma. Installation of equipment has so far reached Biharamulo. We expect that before the end of July, this year, the Mwanza-Bukoba link will be ready for service", the statement added.

On the southern regions, the statement said Songea and Njombe would be connected to the north-south network at Nyololo.

CSO: 5500/126

SATELLITE STATION TO START OPERATING IN JUNE

Harare THE HERALD in English 25 Apr 85 "Business Herald" Suppl p 1

[Text] THE $11,5 million earth satellite station at Mazowe constructed by the giant Sumitomo Corporation is now complete and should start operating in June, project manager, Mr Ryosuke Narita, said this week.

Mr Narita said the contractors — Nippon Electric Corporation (a Sumitomo subsidiary) — had completed their side of the contract on April 18 as intended. NEC had wanted to present the station on that day to the Government as "a birthday present" to Zimbabwe but it would now be in commercial operation in June as the Post and Telecommunications was tying up its end of operations, he said.

NEC has built more than 1 000 large and small satellite stations throughout the world but the engineers rate the Mazowe "Standard A" antenna type as one of the best.

Said Mr Tsunesuke Minamoto: "We have constructed more than 50 stations with standard A antennas like the Mazowe one . . . and I believe this is one of the best stations in the world."

He added: "Zimbabwe should get a very good performance."

Mr Narita said one engineer from NEC would remain in the country for six months to give maintenance support to PTC. Another Japanese telecommunications expert had been made available by his government as a consultant to the PTC for a year.

"We are confident that PTC will run the station well but of course if there is any problem NEC will send an engineer here. We have a lot of experience in building these stations and we have not had any need to send our engineer to look at faults because we have not had any."

Sumitomo had trained in Japan 14 PTC technicians who will man the station and from February the company's testing engineer had been running on the spot lessons for PTC staff at Mazowe, he said.

Provision had been made for the construction of another antenna at the site.

Said Mr Narita: "The demand for international telecommunications facilities is increasing every year and Zimbabwe will definitely need another antenna in the next few years . . ."

Most of the Japanese engineers leave for Tokyo this week. At its peak, the station had about 20 Japanese engineers working on it.

CSO: 5500/139

SPOT, VIKING LAUNCH DELAY COSTS SWEDISH FIRM MILLIONS

Stockholm NY TEKNIK in Swedish 7 Feb 85 p 31

[Text] Launching of the Swedish satellite Viking is being delayed for 6 months.

The reason is that it is hitching a ride on SPOT, the French earth resources satellite, which is not yet ready.

SPOT's delay is costing the Satellite Picture Corporation in Kiruna 10 million kronor. The firm's entire existence is based on SPOT.

The SPOT satellite and its little brother Viking were actually supposed to have been launched by an Ariane rocket in the spring of 1985 from Kourou in French Guiana, South America.

But the French technicians simply cannot have the satellite ready in time. The launch is now planned for October 1985.

"Certainly the delay is costing us a lot of money, but we can handle the losses," says Lars Bjerkesjo, the Satellite Picture Corporation's financial officer.

Sigh of Relief

He continues: "People in the company are almost giving a sigh of relief. This will give us plenty of time in which to train the personnel who will 'bring down' the information from the satellite at the Esrange rocket base, and we will have more time in which to market the product."

The product is processed and enhanced information about the earth that will be sold to customers all over the world.

In many cases, those customers will probably be found in the developing countries, since most of them have large land areas that are unmapped. But even closer to home, there should be considerable interest in earth information provided by satellite, says Bjerkesjo. As examples, he mentions people in forestry and agriculture, defense, land surveying, road maintenance, conservation, and so on.

"For many of those people, who perhaps are accustomed to traditional aerial photography, it may feel strange to have to rethink the matter. That is what we have to work on between now and the launching."

All information signals from SPOT will be stored on magnetic tape at Esrange. The Satellite Picture Corporation will then take charge of the tapes, which are the raw material, so to speak.

Recruiting Personnel

Each magnetic tape will then be played back, and a corrected photographic product will be produced on 70mm film for each 60x60km record. Those "photos" (quick looks) then become the catalogue material: the "semimanufactured product" that will serve as the basis for further work.

"After that, it is up to the customer to ask for whatever he wants. He may want an exact picture of the extent of clear-cut areas in a particular region or of water quality in the lakes of a particular county."

The Satellite Picture Corporation currently employs 23 men and women. By the time SPOT is launched, it will have almost twice that many.

An optimistic Lars Bjerkesjo says: "Generally speaking, our combined knowledge and experience will enable us to execute almost any order."

11798
CSO: 5500/2635

EFFORTS OF EC TO COMPETE IN TELECOMMUNICATIONS MARKET

Brussels LE SOIR in French 4 Apr 85 pp 1, 8

[Article by Guy Duplat]

[Text] For the next 10 years, the world telecommunications market in its broad sense is estimated to represent between 25,000 and 50,000 billion Belgian francs! A colossal manna that attracts American, Japanese and European industries.

The EC [European Community] is very strong in this field, but its [market] position is very weak, in that its fragmented markets, the "petty public-sector protectionisms" of its 10 member countries narrow its potential for opening its doors fully to the communications society that is making its advent, and prevents European industry from preparing to meet the challenges of tomorrow

It cannot afford, however, to lose this battle. The weapons are known: standardization of technical standards, opening of public-sector contracting to international bidding, and synergy of enterprises. The acquiring of these weapons is currently of the utmost urgency...

When he was European commissioner, Viscount Davignon was more than just someone aware of these stakes. He sowed the ferment of a Europe of the telecommunications age which is slowly coming into being. Even during a meeting of the heads of state and of government of the Ten, as delicate as was the "summit" held last week in Brussels, the time could be found to address this problem positively. The heads of state and of government openly recommended the creation of joint European standards and the opening up of public-sector contracting. They would like to see "a breakthrough in telecommunications." And they are committing themselves--which is important from a policy standpoint--to study, at each meeting of the European Council, a report by the Commission, on the progress being made towards a technological strengthening of the European economy.

In this context, our RTT's [Telegraph and Telephone Administration('s)] "contract of the century," even though it boils down finally to sums of "modest" size (40 to 70 billion francs in all) looms as a possible test of a joint

European telecommunications effort. In this connection, it is not surprising to see Etienne Davignon in action again, [this time] as the prime mover of the takeover of the ACEC [Charleroi Electrical Engineering Shops] by the Societe Generale and the French CGE [General Electric Company] group.

This "contract of the century" will be put on the rails this Thursday as reported on page 2 of this issue. But for a more detailed view of the Europe of the telecommunications age, we met with Michel Carpentier, head of the European Commission's "Data Processing and Telecommunications Technology" task force.

In the field of new technologies, telecommunications is one of Europe's strong points--perhaps our last strong point. The European trade balance in this sector is largely positive (a surplus of over $1 billion).

But this position is threatened. First of all, because telecommunications is closely linked today with data processing and microelectronics. A telephone exchange has become a specialized computer. And European shortcomings as regards components and data processing are glaring.

Europe is also threatened by the magnitude of the investments that need to be made. Today's digital telephone exchanges have each cost over $1 billion in research and development outlays. The wideband exchanges of the year 2000 will undoubtedly necessitate investments three times as large. To amortize an outlay of this magnitude, the American and Japanese firms have the advantage of a very vast market. Europe, on the other hand, with its fragmented market and its nine different switching systems, will have lost before it starts unless it regroups. Within 20 years, no more than five or six world-class groups will remain in existence. But among these, how many European groups will there be?

The building of a telecommunications-age Europe is indispensable not only for this sector but also for industry as a whole. Today, there are in Europe three mobile telephone systems, three videotex standards. Documents cannot be transmitted from Bremen to Brest, and if one drives from Brussels to Basel one must have three different types of telephone equipment aboard. A communications company starting up in Europe risks becoming a Tower of Babel of incommunicability.

Uniform Standards

"We are very much aware of these stakes," replies Michel Carpentier, "and we have already made some giant steps forward." The first battle is that of joint standards. The institutes of standardization are working relentlessly: CEPT [European Conference of Post and Tececommunications Administrations], CEN [expansion unknown], and CENELEC [expansion unknown]. They are establishing a list of priorities. To avoid bottlenecks, it has even been agreed that these institutes will no longer adhere, in their proceedings, to the unanimity rule, but instead to the rule of simple majority. "We have already made vast progress. We have had to shake up thousands of engineers and

overcome powerful protectionist interests." The 12 big European data processing firms have chosen the "OSI" as the intercomputer communications standard. IBM, which has its own standard (SNA), "is conforming today to this European standard," comments Mr Carpentier with an air of satisfaction. Seven European data processing firms have just recently adopted AT&T's UNIX as their operating standard. "We do not have an anti-IBM policy. We want to pursue a policy that does not render the user a prisoner of his supplier. We want to allow him his freedom of choice and stimulate competition."

To unify the European telecommunications market, a second stage will be the opening up of public-sector contracting. On 12 November last, the European Council of Ministers adopted a recommendation advocating the opening up of contracting at the RFB [request for bids] level to competition, to the extent of 100 percent for terminals and 10 percent for exchange equipment--a recommendation that is rarely followed and that collides head-on with the protectionism of the member countries.

"That recommendation is primarily a symbol," comments Mr Carpentier. "The expression of a state of mind. But for us it is much more important to impose joint standards, a reciprocal recognition of equipment tests, and a joint type acceptance procedure. Then the domestic markets will be open de facto.

"By the end of May, two sets of guidelines are to be submitted, setting forth proposed joint technical specifications for procurement in all the member countries, and for the use of these joint specifications as well as mutual recognition of tests in public-sector contracts."

Videoconferencing

After agreement on standards and the opening up of markets, a third line of action of the EEC [European Economic Community] is to be the fostering of synergies of enterprises. Most recently, four giants of the European telephone industry--CIT-Alcatel, Italtel, Pleyssey and Siemens--joined forces to develop certain public-network switching subsystems. The takeover today of ACEC by the Societe Generale and the French CGE could also serve as the developmental cornerstone of a European telecommunications bloc.

The stakes are obviously of the essence, since it is estimated that worldwide investments in telecommunications over the next 10 years will total between 500 billion and 1,000 billion ECU [European counting unit(s)].

The final phase of the EEC's effort will be the stimulation of demand.

To begin with, the Community has a large-scale program to develop videoconferencing among all the European capitals. Studios have been ordered for Brussels and Luxembourg. A feasibility study has almost been completed. In June already, videoconferencing demonstrations will be possible between two capitals, and within 2 years all the capitals will be able to be videoconferenced together.

Super-'RACE'

But the most ambitious project is RACE [expansion unknown]. This project calls for the actualization, before the year 2000, of the "telecommunications superhighways" of the future--optic-fiber wideband networks capable of transmitting sound, video (television, for example) and information processing data. At the Brussels Council meeting, the heads of state and of governments did not have the time to approve the first phase of this ambitious program. This is to be done at the next Council meeting in June.

The RACE's definitional phase would then cover the period July 1985-yearend 1986. It will include determining the makeup of these wideband (IBC [expanssion unknown]) networks, and what terminals will be connected to it, and, above all, identifying the major research efforts that will be indispensable to the attainment of these networks (ultra-fast optoelectronic components, etc). A budget of 40 million ECU, half to be paid by the EEC, is being contemplated for this first phase of this "Esprit" telecommunications program. "The question of whether the European subsidiaries of the American telecommunications groups will be able to join this project has not been addressed as yet." Similarly, Mr Carpentier is not very specific when it comes to the question of the budgetary effort the EEC is prepared to make for the subsequent phases of RACE, which will probably involve vast sums. "There will not be a direct budgetary contribution by the Community," he says, "but we may be able to bring some of our financing entities into the picture."

Pending RACE, which is to be the big European-mobilization project, the EEC is seeking to promote the TBB [expansion unknown]--a narrowband integrated telecommunications network for 1990-1995 for businees use. This network is expected to cost $3 billion. The EEC is acting as a sort of middleman, bringing together the heads of PTT's of the member countries for the purpose of developing this network.

The Europe of the telecommunications age is thus on the move, but at a time when technology has the upper hand, Europe has no more time to lose if it intends to win the battle. The enterprises, the governments, the EEC, all want to win it. But public opinion has still to be mobilized around this vital project.

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EUROPEAN AFFAIRS

BRIEFS

HARDWARE DEVELOPMENT FOR ERS-1--The hardware development phase of the satellite earth observation system ERS-1 was able to start in December at Dornier after the green light was given unanimously by the ESA-"Industrial Policy Committee," the body of representatives of the 13 nations involved in the ERS Program. According to plans, the ERS-1 satellite will be launched by an Ariane rocket into a solar-synchronous earth orbit in mid-1989. The satellite is to have a service life of approximately three years, and will serve various disciplines of earth science as well as the research of applications for satellite earth observation technology. In particular, the applications include weather and oceanic forecasts; support of offshore activities and the fishing industry; optimal planning of shipping routes; monitoring the movement of ice, oceanic pollution and tides; and determination of wind/wave fields and circulation patterns. Discoveries made in the ERS-1 program will be incorporated into a worldwide data service, to be available to government agencies, institutes and international organizations. According to current plans for the industrial contract given to Dornier, costs for the ERS 1 program total approximately DM 750 million, of which around 80 percent will be subcontracted to additional suppliers by Dornier. [Text] [Duesseldorf VDI NACHRICHTEN in German 4 Jan 1985 p 1] 12870

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DENMARK

HYBRID CABLE NET THREATENED BY TV SATELLITES, INDUSTRY APATHY

FRG, French Satellites Challenge

Copenhagen BERLINGSKE TIDENDE in Danish 23 Apr 85 pp 1, 2

[Article by Michael Rastrup Smith: "Lots of Satellite TV at Low Cost"]

> [Text] Only a few years ago, there were only a few who had faith in DBS satellites. Now, the first two of them will be launched next summer and suddenly international TV will be available at a low price. Beginning next year, two huge satellites will supply all of Europe with German, English and French TV. Satellite signals can be received with 60 centimeter dish antennae which will not require a permit from P & T [Post & Telegraph].

From the end of next year, Danes and all other Europeans will have the opportunity to view eight TV programs from two West German and French sister satellites.

Signals from the satellites can be received through newly-developed super cheap equipment and they will transmit a wide offering of the latest films, shows, TV series, informative programs and cultural broadcasts.

When the French satellite is launched on 7 July next year, a whole new race to curry TV viewers' favor will begin. The satellites are a new type--DBS--from which signals can be freely received without any permission from the authorities.

The Germans and French agreed a few days ago on the system (D2-MAC) which the two satellites will use for broadcasting.

The agreement has created great optimism among the firms which will produce equipment for receiving signals from the DBS satellites.

One of the these is the multinational electronics giant, Philips, which is ready to begin production of DBS receiving equipment in its plant in France.

The dish antennae for the DBS satellites are from 60 centimeters in diameter, and a single antenna can receive signals from both satellites. A

complete receiving system is expected to cost around 6,000 kroner for private use and about 100,000 for equipment for a large common antenna system. A spokesman for Philips in Norrkoping, Roald Ekinge, who has developed the DBS equipment, says that sales of DBS equipment are expected in the same volume as video equipment is being sold today.

The two huge satellites--one German and one French--now are threatening the expansion of the hybrid network.

On 7 July next year, France will launch the "TDF-1" satellite. Nearly simultaneously, the Germans will launch another satellite, "TV-SAT". Both are so-called DBS satellites from which one can receive signals without a permit from P & T and without connecting to the hybrid network.

At the moment, fifteen TV programs are broadcast via the so-called communications satellites. P & T has the exclusive right to receive signals from them, and therefore, one is required to connect to the future hybrid net if one wishes to see the programs.

The situation is different with the DBS satellites. The French TDF-1 and German TV-SAT function on frequencies which can be received by anyone. In addition, they differ from the communications satellites in that they broadcast with a much greater power.

The powerful broadcast signal is an advantage because one needs only small dish antennae for receiving signals from the DBS satellites.

According to current plans, the German "TV-SAT" will transmit the program, "Sat-1," which primarily will broadcast American series and films. The program is financed through advertisements.

A private consortium--including among others, publishing magnate Axel Springer as a participant--will broadcast features, films and shows on another channel. The program is pay TV.

On a third channel, ARD will broadcast a program with cultural content, possibly in cooperation with the Swiss SRG. The program is without advertisements.

The last channel will transmit "3-sat," which is an informative and cultural program produced by ZDF, SRG and the Austrian ORF. The program is without advertisements. The French announced a month ago that they will launch the TDF-1 satellite on 7 July 1986. This satellite is nearly identical to the German one and also will have four TV channels.

The former director for the French nationwide TV program "Antenne-2," Pierre Desgraupes, at the moment is putting together a European channel which will broadcast via the satellite.

Luxembourg is negotiating to take over two of the channels where a French and a German program with advertisements are being planned.

Finally, News International in London, which is owned by the Australian publishing magnate, Rupert Murdoch, is negotiating to lease the final channel. News International is a co-owner of the popular satellite program "Sky Channel," which broadcasts today via the communications satellite.

The German and French DBS satellite programs can have wide distribution in Denmark because it will be more economical for community antenna systems to receive signals from these satellites, instead of the communication satellites which can only broadcast via the hybrid network.

Yesterday, Ishoj's mayor, Per Madsen, said that he did not want to connect Ishoj's municipal antenna system to the hybrid network because it would cost the municipality 1 million kroner per year.

In comparison, Ishoj will be able to connect to the eight DBS programs for a one-time investment of 100,000 kroner.

Mayors Cite Industry Apathy

Copenhagen BERLINGSKE TIDENDE in Danish 22 Apr 85 p 9

[Article by Michael Rastrup Smith: "Little Interest Among Firms in Hybrid Net"]

> [Text] A majority of the 52 mayors in the KTAS [Copenhagen Telephone Company] area believe that information on the hybrid network has been inadequate. This is shown by a survey of 97 municipalities.

Industry shows very little interest at the local level for connecting to the hybrid network.

This appears from a telephone survey which BERLINGSKE made of the mayors of 96 municipalities on Zealand, Lolland-Falster and Bornholm. The mayors represent all of the municipalities within the KTAS area.

Only six municipalities report interest in the hybrid network from among industrial firms, while 91 municipalities have received no solicitations from industry. It also appears from the survey that only four of the 97 municipalities east of Storebelt have made decisions concerning connections to the hybrid net. Many municipalities base the lack of decision on the fact that the basis for making a decision is lacking.

Inadequate Information

There are 52 mayors who say that the information on the hybrid network has been inadequate, including the chairman of KTAS' representative, mayor Egon Weidekamp. On the other hand, 45 mayors believe that the information has

been adequate. Among the mayors who find the information to be inadequate, is the repeated argument that the materials on the hybrid network have been incomprehensible.

Among the mayors, 36 will connect their private residences to the hybrid network, while 47 do not want a connection for the simple reason that the hybrid network does not reach the neighborhood of their homes. There are 14 mayors who do not know whether they will connect with the network.

Several mayors point out in more probing comments that interest in their cities in the hybrid network is weak among both citizens and industry. Other mayors say that Denmark cannot avoid the network if industry is to continue to hold its own ground.

Common Antenna System

Generally, there is least interest in the hybrid network in municipalities with large common antenna systems. Ballerup has several very large building societies with their own antenna systems. Mayor Ove E. Dalsgaard states as follows on this subject:

"In 1983, we invited all housing societies and landowner associations to a meeting with KTAS. At that time, the parties were very reserved because of financing. In the meantime, this reserve has not diminished."

Ishoj has its own municipal antenna system. There are 7,600 households which are connected to the system which has eight TV programs and costs each individual household 170 kroner annually. The municipality is situated such that it easily could connect with the hybrid network, but the town mayor, Per Madsen, says "no thanks":

"We were contacted by KTAS which offered us Norway and East Germany via the hybrid network. It would cost 1 million kroner annually for that. I call that type thing an abuse of a monopoly and an improper tightening of the screws.

"KTAS treats us exactly as it suits them because the company knows that Parliament has decided that we will have a hybrid network. That type of thing is no better than that which happens under a totalitarian dictator," Per Madsen states.

He poses a further question concerning how many jobs the hybrid net will create:

"It is a hoax that the hybrid network will be decisive for industry. The first portion of the network which exter is between Vordingborg and Vallensbaek is absolutely not made with Danish cable, but rather, West German."

In Horsholm, mayor Ove Sundberg is more positive about the hybrid network:

"With the hybrid network, we will decisively break the monopoly of DR [Danish National Radio]. That is a plus for all of us. It also is good for the culture, which must pull itself together and demonstrate more attentiveness. Additionally, Danes will acquire greater international awareness when they receive foreign TV programs.

"But I must admit that interest among industry is just as great as expected. And I would caution against the hybrid network being used for commercial purposes. One would thereby risk destroying the greater part of Zealand All areas should have the same offer to connect to the network."

In Hvidovre, which with the industry on Avedore, is one of the capital area's largest industrial municipalities, there also is little interest in business circles in the hybrid network:

"I have aired the plan for the hybrid network among the Association of Industrial Landowners on Avedor, but there was no immediate reaction or interest," states mayor Inge Larsen.

On Lolland-Falster, where industry if fighting hard for its life, and where unemployment weighs heavily, there are greater hopes for the hybrid network:

In Holeby, mayor Fridtjof Nielsen says that support for the hybrid network is based solely on the ground of business:

"We have learned one thing from the development. That is, always to be open for everything new. Otherwise we will become losers, as happened so often before. Therefore, we support the hybrid network, which we have been told is a requirement if communications are to develop."

	Yes	No	Don't know
Has the city made decision about connection to hybrid network?	4	93	--
Has the city had inquiries from industry about connections?	6	91	--
Has information about hybrid network been adequate?	45	54	--
Does the mayor want to connect private residence to hybrid network?	36	46	15

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FEDERAL REPUBLIC OF GERMANY

BRIEFS

NEW SATELLITE CONSTRUCTION PLANT--ANT Communications Technology celebrated the opening of its new communications satellite production plant in late October. At this facility, the communications payloads of up to six satellites can be installed simultaneously in one assembly area. The plant also houses areas for the production and testing of systems components Total capital invested in the facility is just over DM 20 million. The enterprise based in the Swabian town of Backnang has been active in the field of communications satellite technology for almost 20 years. To date ANT has been involved in the production of 15 satellites. The firm now has orders for equipment to be installed in 24 more, among them the payloads for ECS 1 through 5, TV-Sat and DFS-Kopernikus. All told, the Space Division of ANT now has almost 500 billion DM in orders, a figure which represents 30 percent growth in sales between 1983 and 1986. [Text] [Frankfurt/Main AEROKURIER Dec 1984 p 1298] 12870

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